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ECONOMIC AFFAIRS

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PLANNING AND PLAN IMPLEMENTATIONS

IMPORTANCE OF OVERALL APPROACH TO PLANNING STRESSED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 12, Dec 84 pp 51-59

[Article by N. Smetanin, deputy division chief of the USSR Gosplan: "A Comprehensive Approach to Planning--A Law in the Modern Stage of Development of the Economy"]

[Text] A comprehensive approach to planning presupposes all-round investigation of the interconnected natural, material, social, organizational and other conditions of production, and, on the basis of this, planning of a more efficient combination of these in order to achieve the earmarked goals of the socioeconomic development with reduced expenditures. In other words, to approach comprehensively means to encompass the entire totality of aspects of public production in their interconnection.

The need for a comprehensive approach in planning ensued primarily from the interaction of the system of economic laws of socialism, which only in their totality depict the cause-and-effect relationship in the process of public production. Thus the effectiveness of planning becomes directly on the level of awareness and planned utilization of objective economic laws in concrete forms of their manifestation in one or another stage of the development of the society, and a comprehensive approach to planning is a quality which is internally inherent in planned management of the economy under socialism. This understanding of the nature of comprehensive planning is confirmed by the experience of our country (for example, the development of the GOELRO Plan and other large national economic programs and the comprehensive nature of each of the five-year and annual plans for the country's economic and social development).

Party and government decrees of recent years have consistently raised the problem of making the comprehensive approach all-encompassing.

The CPSU Central Committee and the USSR Council of Ministers adopted a special decree concerning improvement of the work of the USSR Gosplan which is directed "...toward strengthening the comprehensive approach to planning interconnected branches of the national economy and regions of the country and solving large economic and social problems."¹

This is related to the fact that, because of a number of reasons, in the modern stage of development of the economy a comprehensive approach to planning is becoming especially crucial.

The first of the reasons, in our opinion, is the objective need to change the economy over to an intensive, resource-saving path of development. The changeover to the new type of reproduction in long-range and current plans is manifested primarily in the reduction of proportional expenditures of resources as compared to preceding years. Thus while under the 9th and 10th five-year plans for each percentage of increase of the production of the gross agricultural product there was a corresponding increase in capital investments and deliveries of mineral fertilizers of 3-5 percent, under the 11th Five-Year Plan this increase in capital investments should amount to only 0.8-0.9 percent, and for mineral fertilizers--less than 2 percent.

But a directive reduction of the indicators of proportional expenditures of resources alone is not enough for a reorientation of the economy toward the intensive path of development since within the framework of centralized planned assignments at the basic level of production many decentralized decisions are made, which frequently caused a desire for inertia in the development of production. Under certain circumstances this can seriously weaken the results of the course that has been adopted toward comprehensive savings on resources and more effective utilization of the production potential which has been created. This is clearly corroborated by the results of the 10th Five-Year Plan.

In order to change the economy over to a resource-saving path of development and to make the process of intensification all-encompassing and long-term in nature, it is necessary to augment the centralized change in the proportions of production with a directed change in the methods of planning.

The primary basis for the methodology of planning under the new conditions is the circumstance that, as distinct from the extensive type of expanded reproduction, whereby additional allotment of capital investments and material resources served as the main means of planned influence on the dynamics and structure of public production, there are numerous factors in intensive growth. In their totality they comprise a complex system of interdependent processes and phenomena of material production and public life. Intensive growth factors of the first order are increased labor productivity, increased output-capital ratio and reduced material-intensiveness of production. The increase in labor productivity, in turn, is determined by the scope of introduction of scientific and technical achievements, the level of organization of labor and labor discipline, the effectiveness of the moral and material stimuli that are applied, the effectiveness of ideological work and the moral-psychological climate in production, in public life, in daily life and so forth. The same complex and long chain is composed of factors on which the level of utilization of fixed capital and material resources depends. To reflect the entire diversity of factors in intensive growth, their "interconnection and interdependency is possible only with a comprehensive approach to planning, taking into account the resource, scientific and technical and social factors and conditions of production, that is, comprehensively.

The second reason why the comprehensive approach to planning is so crucial is related to the transformation of the country's economy into a unified national economic complex. It embraces various units of public production, distribution and exchange and is a unity of the material and technical base of mature socialism, an economic system which has withstood the test of time and is based on public ownership of means of production and state centralized planning and management.

The functioning of the economy as a unified national economic complex is reflected directly in the sharp increase in the interdependency of all units of public production, the extensive development of interbranch production ties, and the strengthening of integration processes which embrace all or individual interacting stages of production and distribution of one product or another. On this basis there are changes in the production structure of the national economy. The branches of the national economy which have been separated during the process of public division of labor and deepening of production specialization, which are related to the manufacture of a particular product (group of products of the same kind) or by the fact that they use the same raw material, discover a tendency toward reunification within the framework of the new multibranch structures--interbranch complexes. As a result, interbranch ties expand and become more complicated, and they play a greater role as regulators of the development of various aspects of public production.

The most complex in terms of the composition of the branches included in them and their internal structure are interbranch complexes which appear on the basis of extensive development of production ties of a vertical nature among enterprises and entire branches which represent sequential stages of a unified process of production and distribution.

An example of interbranch complexes of this kind is the national economic agroindustrial complex. Under modern conditions the production of food products from agricultural raw material has gone far beyond the framework of agriculture. Many factors which determine its growth are formed in branches which are engaged in production of means of production for it, industrial manufacture, processing, transportation and storage of products, production and technical servicing, supply and sales.

The most important conditions for effectively combining these factors and, consequently, carrying out the process of reproduction are continuous improvement of production ties among the aforementioned branches in order to coordinate the entire system of material flows of products (services) of industry and agriculture and the provision of substantiated proportionality in the development of the branches.

Along with the continuing deepening of public division of labor, the generation of new functions from agriculture and the transfer of these to industry (differentiation of production) there arose a need to develop the reverse process--integration (unification) of agricultural and industrial production, which has come to be called agroindustrial integration in modern literature. This is a complex process of technological, economic and

organizational unification (merging) of interconnected stages of production, storage, processing and delivery to the consumer of food products and consumer goods made of agricultural raw material, their gradual growth into a unified process of production of particular kinds of final product, the formation of which, in turn, requires an adequate approach to planning the development of enterprises and branches which are sequential stages in this process.

Based on the appearance of a different kind of interbranch complexes is the development of ties of a horizontal nature which are called upon to regulate the production of products intended for satisfying similar needs, for example, the fuel and energy complex and the construction materials complex. As distinct from the APK the production of branches that are included in these complexes does not amount to sequential stages of a unified process of reproduction of the final kinds of products. These are rather parallel technological lines of production for producing products, which although they are different are intended for satisfying similar needs. The nature of interbranch ties in them is determined by the interreplaceability of products of the branches included in them. This means that effective satisfaction of the needs can be provided only on the basis of their intercoordinated development and, consequently, an interbranch approach is needed for planning both the fuel and energy base and the production of construction materials.

The third reason for the increase in the role of the comprehensive approach in planning is the recognition by scientific and practical workers of the fact that under modern conditions, because of the sharp increase in the scope of the economy, the complication of its structure and the multifold increase of interbranch ties, it is practically impossible to reflect many of the most important goals, means and ways of achieving them through branch and territorial plans.

Branch planning is characterized by the large number, the complexity and the dynamism of intrabranch production ties, which exert a decisive influence on the results of production. On the basis of branch plans we have solved and are solving problems of accelerating scientific and technical progress, satisfying the country's needs for products of the corresponding branches in the necessary volumes and variety, providing personnel, increasing their qualifications and other radical problems in the development of the economy. As the most important means of planned influence we use centralized allotment of capital investments, funded material resources and, in a number of cases, monetary resources.

Branch plans developed in the territorial cross-section have served to a considerable degree as a basis for preparing plans for the development of regions as well.

The branch principle of planning and management, along with its positive qualities, also has essential shortcomings. One of them is the considerable pressure on the economy from departmental interests, which are the reason for the appearance and the long duration of disproportions in the development of enterprises and branches which are closely interconnected in the process of production but belong to different departments.

The branch ministries and branch divisions of the USSR Gosplan interact poorly in solving questions of the distribution and balanced development of production capacities, more expedient utilization of resources for multiple purposes (capital investments, means of transportation and so forth) and raw materials, and the search for effective ways of achieving the final goals. This is why the effect obtained from the implementation of one in one branch sometimes ends up in increased expenditures and losses of products at enterprises of other branches and gives rise to disproportions which have a fatal influence on the results of the activity of the partners.

These shortcomings can be eliminated during the course of balancing the branch plans at the national economic level since they (the shortcomings) are not manifested in the consolidated calculations which are used for this kind of balancing. It is unrealistic to demand more detailed calculations from the consolidated and balance divisions which determine the most important national economic proportions.

In the modern stage of development of the economy the narrowness of the branch framework for solving many problems of economic growth is clearly manifested. Under the conditions of intensification, repeated increase of the scope and complication of production, the higher level of its collectivization, specialization and volumes of cooperative deliveries, and the considerable expansion and deepening of production ties, an ever-increasing number of problems of economic and social development assume clearly marked interbranch features which do not always coincide with the goals and tasks of the development of each branch individually.

Finally, branch planning does not provide an optimal solution to questions of the development of the production and social infrastructure or effective utilization of labor and natural resources.

The aforementioned shortcomings of the branch approach are somewhat mitigated by territorial planning and management which contribute to the achievement, in keeping with the development of infrastructural elements in the interests of material production, rational distribution of certain multipurpose resources (labor, water, energy and so forth) and the satisfaction of the material and spiritual needs of the population.

As a result of the systematic increase in the rights of the councils of ministers of the union republics and the local soviet agencies, the culmination of the branch and territorial principles in planning has become more balanced. Territorial planning and management is assuming an increasingly clear interbranch comprehensive nature. But the local prejudice, like the departmental prejudice, which it generates is reflected no less harmfully on national economic effectiveness. In a number of cases there is a striving to close the economy of a given region to the detriment of the interests of unionwide division of labor and interregional cooperation of production.

Were it not for these and other shortcomings of branch and territorial principles of planning and management (which can be assumed only as a scientific abstraction), their combination would make it possible to develop

and implement comprehensive, balanced plans for the development of each region. But then it would still be necessary to solve many problems related to the development of branches and territories at the national economic level. We are speaking mainly about establishing in the plans and maintaining during the course of their implementation the proportions for the development of branches and regions and rational balance of their economic growth, and also the provision of interbranch and interregional exchange of products and services on the basis of the interests of the entire national economy. Therefore among the areas for improving national economic planning a special position belongs to the development of a comprehensive approach. All the necessary prerequisites for this exist.

Our country's immense economic potential makes it possible to set and successfully resolve problems for equalizing the technical level of various branches that are included in national economic complexes and achieving proportionality and balance in their development.

Then one forms the necessary production and social infrastructure and material and financial support for the entire totality of production, social, organizational and management problems, and there is a close coordination of the goals and scope of development of the branches of the complex with the interests of more complete satisfaction of the needs of the society for the final kinds of products.

What has been said makes it possible to draw the conclusion that the comprehensive approach to planning can be regarded from the following sides:

as a method of increasing the scientific substantiation of the plan which envisions the need to account for the influence on the planned results of the largest possible number of natural, economic, social, organizational and other factors which are closely intercoordinated and comprise the totality of conditions of one production or another;

as planning of blocks of branches and spheres of activity that are related by a community of the final goal for satisfying particular needs of the society (for food, fuel and energy resources, transportation and so forth), which can be called comprehensive interbranch planning.

Bordering on this, although with its own specific features, is the development of target comprehensive programs for the development of territorial production complexes and individual territories, for example, the Nonchernozem Zone of the RSFSR.

Under modern conditions it is possible to have extensive application of all aspects of the comprehensive approach to planning. But in this article we shall henceforth consider only problems of planning interconnected branches.

Now there is every reason to speak of the existing system of comprehensive interbranch planning. Its constituent parts are:

a comprehensive program for scientific and technical progress for 2 decades in the future;

comprehensive target programs for solving especially important socioeconomic problems or the corresponding sections of the main directions for the development of the economy for the forthcoming 10-15 years;

unified plans for the development of national economic complexes.

The first two documents have already found practical application in national economic planning. There is fairly extensive theoretical research regarding these questions. We have created a particular (although it requires further improvement) methodological and organizational bases for their development and application in planned management of the economy. With respect to comprehensive target programs for socioeconomic development one can note only two aspects which, from our standpoint, have not been reflected quite correctly in a number of research papers or in the activity of the practical workers.

In the first place, the policy envisioned in the basic methodological provisions for the development of target comprehensive national economic programs for approving them along with national economic plans and including them in the latter as appendixes can be retained in the future only for programs with a small range of planning. And in cases of the development and implementation of large-scale target comprehensive national economic programs which are intended for a long period with an extensive list of assignments and measures, which are called upon in their totality to provide for priority of the selected direction or increase the target orientation of planning, it can be changed taking into account their role and nature.

An example of this can be the USSR Food Program for the period of up 1990 which embraces not only branches of the APK, but also the automotive, timber and wood-processing industry, enterprises and organizations of the construction complex and so forth.

These programs become a constituent part of the basic directions for the socioeconomic development of the country, republic or region. Like the basic directions, after approval they must be regarded as a directive or goal-orienting (with a considerable range encompassed by the program) document for the development of five-year and annual plans for the economic and social development of the country and the corresponding regions.

In the second place, even with all their significance target comprehensive programs cannot provide for universality of the comprehensive interbranch approach in planning since they are developed only for individual problems which are the most important in the development of the economy. A comprehensive interbranch approach to planning is possible only with the development, along with target comprehensive programs (food, fuel-energy and so forth) of unified plans for proportional and balanced development of enterprises and branches which are closely intercoordinated in the process of producing particular kinds of final products (services) and which in their totality comprise national economic complexes (agroindustrial, fuel-energy, construction materials and so forth).

In order to strengthen the comprehensive approach to planning, to provide for deeper and more comprehensive analysis of the economy, and to provide a plan for the development of interconnected branches and spheres of activity which is balanced and coordinated in terms of all its indicators, the USSR Gosplan has created administrations for comprehensive planning which are headed by deputy chairmen of the USSR Gosplan. An institute of authorities of the USSR Gosplan has been established in four economic regions (Ural, Western Siberian, Eastern Siberian and Far East). In the central staff of the USSR Gosplan subdivisions have been created for comprehensive territorial planning of the Nonchernozem Zone of the RSFSR, Siberia and the Far East.

At the present time we have a certain amount of experience in intercoordinated planning of blocks of branches which in their totality represent large interbranch national economic or territorial production complexes which already exist or are being formed. And although many questions of methodology, methods and organization of this work remain questionable, the experience that has been accumulated makes it possible to formulate certain of the most general requirements for the new sections of the plan.

As we know, any national economic complex is a complicated multibranch structure. Effective planned management of it requires adequate depiction of this structure in the plan. This brings about the need to plan the complex not only as a unified whole, but also with the breakdown of the branches. Moreover, the plan for the development of one or another complex is not a simple sum of branch plans. Its development presupposes, in the first place, more rigid orientation of the branches toward the achievement of the final goal as a result of the introduction of new or the adaptation of already existing indicators and, second, the augmentation of the branch cross-section with a new comprehensive interbranch section of the plan which should not either duplicate or replace the existing planning.

But what is the content of this section? From the standpoint of reproduction the object of comprehensive interbranch planning is composed of the proportions of development and production ties that arise at the junctures of the branches or the enterprises of the interbranch complex which in the branch plans are either not considered at all or are considered from the positions of only one branch and at the national economic level cannot be manifested because of the high degree of aggregation and generalization of the calculations.

The main tasks of the development of the comprehensive interbranch section of the plan can be designed approximately in the following generalized form:

the establishment of volumes of production of the final product for the planned period taking into account the needs of the national economy and the most effective utilization of the complex of capacities and allotted resources existing in the branches;

the formation for the planning period of interbranch proportions for the development of the complex in order to maximally increase the production of products with the resources that are allotted;

coordinated and mutually determined distribution on the territory of the country or region of production capacities that are included in the complex of the ministries, departments, associations and enterprises for satisfying the needs of the consumers with the minimum of production, transportation and operational expenditures;

the provision of balance of those units of public production within the framework of the complex which are not reflected in an intercoordinated way in the branch plans and are not the object of national economic balancing;

substantiation of the needs of the complex for resources and services that are offered by branches that are not included in it and the defense of these in the corresponding organizations or their subdivisions;

the distribution of capital investments and material resources that are allotted for multipurpose utilization taking into account the needs of the branches of the complex and the solution to problems of an interbranch nature.

The content of the new interbranch section of the plan does not end with the aforementioned calculations and assignments. But they determine the appearance of this section and the goals for which it is to be developed.

In addition to what has been pointed out, in order to give the new section of the plan a certain integrity and finalization during its formation, in the stage of control figures we will determine the need of the national economy for the final kinds of products of the complex and the preliminary possibilities of satisfying them, and also the most significant changes in the interbranch and intrabranh production structure that ensue from this. Here the most important initial data will be efficient norms of consumption (expenditure) of various kinds of products, their allowable interreplaceability, the level of utilization of the production apparatus of the branches of the complex and reserves for increasing it, and resource capabilities of the national economy.

There also arises a need to develop such consolidated indicators as the rate and scale of increase of the production of the final product, increased labor productivity and wages of the workers, structural changes within the complex, and also a whole number of other indicators that characterize its development as a whole.

The means for solving the aforementioned problems in various complexes will be determined, from our point of view, by the nature of the interbranch ties that are inherent in each of them. Thus with respect to the national economic agroindustrial complex the planning methodology should arise from the unified process of production of each kind of final product that has taken form during the course of public division and cooperation of labor which, as was noted, requires an adequate approach to planning the development of enterprises and branches which are sequential stages of this production. The corresponding sections of the plan with their intercoordinated assignments and measures should embrace all links of the technological chain from production to wholesale (and in a number of cases retail) sales of the final product to the consumer.

For meeting these requirements the following will be of decisive significance:

preparation of a comprehensive interbranch section of the plan for the development of the APK in the cross-section of vertically integrated product subcomplexes;

the system of product, capacity, labor and other balances, including the interbranch balance developed with respect to the APK;

the change in the policy for the distribution of resources for complex wide purposes and their coordination with the assignments for developing the agroindustrial production which provides for the orientation of the branches of the APK toward the final results.

The vertically integrated product subcomplexes which embrace blocks of branches, subbranches and enterprises for producing, processing, transporting, storing and selling specific kinds of agricultural raw material and products from its processing and also producing (delivering) means of production which are specific for the given block are becoming not only the content, but also the form of development of the comprehensive interbranch section of the plan.

Within the framework of these subcomplexes the basic work will be carried out for optimization of proportions and provision of balance of the development of all units of the unified technological process for the production of each kind of final product or group of homogeneous products, which is directed toward the achievement of correspondence of the internal structure of the subcomplex and its individual parts to the final interests of the functioning of the APK.

The main instrument for providing for the necessary proportions in the development of all interacting units of the APK will be the system of balanced calculations. Its constituent parts are: the interbranch balance which is developed with respect to the national economic agroindustrial complex, balances of production capacities in the main kinds of products which are compiled within the framework of vertically integrated subcomplexes, the balance of labor resources at the agroindustrial complex, and others. The composition of the system of balances will be fully determined during the course of the establishment and perfection of the methodology and practice of planning the APK.

Comprehensive planning is called upon to provide a policy in the distribution of capital investments and material resources allotted for the APK as a whole whereby in each given stage it is possible to use them for the development of units which determine the results of the functioning of the entire technological process.

To these ends, in the stage of control figures when preparing the drafts of the plans for the next period, it would be expedient to formulate and inform the union republics of the limits on capital investments and material resources for general complex purposes, and in the republics they should inform the krays and the oblasts for the entire agroindustrial complex as a whole without a breakdown for the various branches. At the same time the

ministries and departments of the USSR should establish limits on capital investments and the corresponding material resources for the realization of unionwide goals.

Based on the earmarked increase in the production of foodstuffs and agricultural raw material and the existing structure of the agroindustrial complex of the given region, the territorial agencies should develop proposals for the distribution of the capital investments and material resources allotted to them among the branches and enterprises of the complex. On the basis of these the central agencies, with the participation of the union republics, will form the branch cross-section of investments and material resources for the forthcoming period.

This approach will make it possible to achieve smooth operation of all units of the APK and to take into account as much as possible local proposals as well as to provide for coordination of branch and territorial plans and the drawing up of balanced plans for the development of the agroindustrial complexes of the individual regions.

When planning other national economic complexes the means of planned influence on solving interbranch problems and interbranch balancing will be different. But in all cases they should affect the consideration of the complexes of interconnected branches as a unified whole both in terms of the final results of their functioning (volumes and effectiveness of production) and in terms of the resources that are allotted.

It is necessary to draw up more actively unified plans for the development of national economic complexes so that under the 12th Five-Year Plan it will be possible to basically complete the formation of a system of comprehensive interbranch planning.

FOOTNOTE

1. "Materialy XXVI S"yezda KPSS" [Materials of the 26th CPSU Congress], Moscow, Politizdat, 1981, p 125.

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PLANNING AND PLANNING IMPLEMENTATION

TARGETS FOR LAST YEAR OF FYP RESTATED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 12, Dec 84 pp 3-8

[Article: "The Plan of the Final Year of the Five-Year Plan"]

[Text] The State Plan for the Economic and Social Development of the USSR for 1985, which was adopted by the second session of the USSR Supreme Soviet, directs labor collectives of the country toward the achievement of new goals in industrial and agricultural production, transportation, capital construction, including the introduction of new residential buildings and facilities for social and cultural purposes, and toward more extensive utilization of the achievements of science and technology as a decisive condition for increasing labor productivity, increasing the effectiveness of production and improving the quality of products that are produced.

The assignments of the plan of the final year of the 11th Five-Year Plan reinforce and develop the positive tendencies that have been achieved recently in the development of the branches of the national economy and provide for the most important proportions determined by the 26th CPSU Congress. Thus in 1984 the rates of development of the economy in terms of the main indicators are expected to be at the level earmarked by the plan for this year, and some of them should be higher. The national income will increase this year by 3.1 percent, as was envisioned by the plan, and industrial production--by 4.4 percent as compared to 3.8 percent according to the plan.

Assignments for increasing the effectiveness of public production, mainly increasing labor productivity, are being fulfilled. In industry it exceeds 4 percent as compared to 3.4 percent according to the plan, as a result of which more than 90 percent of the increase in industrial output will be achieved, and in agriculture and rail transportation all of the increase will be achieved as a result of this factor.

We are close to fulfilling the assignments for above-plan increase in labor productivity by 1 percent and reduction of production costs by 0.5 percent.

The expected positive results for 1984 show the expansion of the influence of intensive factors on the development of branches of the national economy on the basis of improvement of production technology, labor organization,

increased discipline and more extensive introduction of scientific and technical achievements.

This year about 4,000 models of new types of machines, equipment, devices, instruments, materials and means of automation are to be created and the application of robots is to be expanded.

The achievements in the sphere of material production are being favorably reflected in the social development and in the higher standard of living of the people. The real per capita income of the population will increase in 1984 by 3.3 percent as compared to 3.1 percent according to the five-year plan for this period, and the monthly earnings of workers and employees and the wages of kolkhoz workers will also increase. Construction workers will construct about 114 million square meters of overall dwelling space in residential buildings, which will make it possible to improve the housing conditions for approximately 10 million people.

The results of the fulfillment of the 1984 plan for 9 months show the positive tendencies in the development of the economy. Thus the plan for product sales was fulfilled by all industrial ministries and union republics. Labor productivity increased by 3.7 percent and 94 percent of the increase in production was achieved as a result of this. Labor productivity during this period outstripped the growth of average wages. The planned volume of production of consumer goods was achieved.

Still, in spite of the marked improvement of the state of affairs in the development of the country's economy, we have not been able to fully compensate for the arrears that existed during the first 2 years of the five-year plan with respect to individual indicators. Plans of the five-year plan were not fulfilled for the production of agricultural products, there are arrears in the implementation of assignments for the introduction of new technical equipment and technology and to production economizing on material resources, and introducing fixed capital and production capacities. During the 9 months assignments were not carried out for the extraction of petroleum, the production of commercial timber, synthetic resins and plastics, chemical fibers and threads, chemical equipment, machines and equipment for animal husbandry and feed production, and so forth.

Therefore in the final year of the 11th Five-Year Plan it will be necessary to solve a number of problems, which will contribute to the stability and the development of the economy, taking into account the fact that the results of 1985 will be the basis for the development of the draft of the plan for the 12th Five-Year Plan.

In connection with this a number of peculiarities are inherent in the 1985 plan. Next year the absolute growth in terms of a number of the most important indicators will increase as compared to 1984; the volumes of capital investments used for technical re-equipment and reconstruction of existing enterprises will increase; the regimen of economizing on raw materials, fuel and energy and process material resources will be strengthened; more difficult assignments will be determined for the indicators of the effectiveness of public production, mainly increased labor productivity and improvement of the

utilization of production capacities and fixed capital, as a result of which there should be an increase in the volumes of industrial production without enlisting additional labor force. This is conditioned by the need for extensive introduction in all branches of the national economy of a complex of measures for accelerating the introduction of the latest achievements of science and technology, automation and mechanization, scientific organization of production, the development of collective forms of labor, improvement of labor incentives, and improvement of norm-setting for labor.

Another typical feature of 1985 is expansion of the economic experiment. The results of the operation of the enterprises of five branches--Ministry of Heavy Machine Building, Ministry of the Electrical Equipment Industry, Ministry of the Food Industry of the Ukraine, Ministry of Light Industry of Belorussia and Ministry of Local Industry of Lithuania--in 1984 showed the positive influence of the experiment on the results of their work. The enterprises have been given greater rights and greater responsibilities, and they have been relieved of excessive red tape from central agencies.

Beginning on 1 January 1985 enterprises of a number of other ministries will be changed over to the conditions of the experiment, which will embrace branches of machine building, light and the food industry, fishing, local industry and consumer services. These enterprises will produce 12 percent of the output in industry. Under the conditions of the experiment the role of economic levers and stimuli which includes the final results of the activity of the enterprises increases.

Labor productivity in industry in 1985 will increase by 3.7 percent, construction--by 3.5 percent, and rail transportation--by 2.1 percent.

The assignments of the plan for increasing labor productivity in the branches of the national economy presuppose local development of concrete measures which provide for their fulfillment. There are now more than 50 million people employed in manual labor in the national economy. Their proportion is great in construction, agriculture, the coal industry, the food industry, trade and auxiliary work. In order to gradually reduce manual labor, in 1985 work will be continued for certification and streamlining of work stations, the collectivist foundations for production will be strengthened, and brigade forms of organization and stimulation of labor will be utilized more effectively. For example, calculations show that as a result of the implementation of measures for scientific organization of labor (NOT) labor productivity in industry can be increased in 1985 by more than 2 percent.

An important feature of 1985 is the currently developing competition for a worthy greeting for the 40th anniversary of the victory of the Soviet people in the Great Patriotic War. This patriotic initiative of the workers of the hero cities was a response to the decision of the CPSU Central Committee to celebrate the glorious anniversary of our people's feat of arms as a national holiday. The memorial watches are distinguished by a desire to achieve new labor goals. The mining brigade of M. Chikh (the Pervomayskaya mine in Rostov Oblast) made a commitment to be the first branch in history to extract 1 million tons of coal a year from thin layers, and the metallurgists of the Serp i Molot Plant in the capital conducted the first of 40 shock weeks which

the leading enterprises of Moscow have resolved to devote to the 40th anniversary of the victory. Participants in the memorial watch are finding many effective means and methods of increasing the militancy of the competition in the struggle for increasing labor productivity and economizing on material resources.

In 1985 the national income which is used for consumption and accumulation in the interests of all members of the society will increase by 3.5 percent, industrial production--3.9 percent, agricultural output--6.7 percent, cargo turnover on transportation--3.3 percent, including rail transportation--1.8 percent, and the volume of capital investments from all sources of financing--3.4 percent. The social program envisions increasing real incomes of the population by 3.3 percent, public consumption funds--5 percent, and commodity turnover--5.2 percent.

The increased volumes of industrial production will be accompanied by qualitative changes. The plan envisions more rapid growth of the processing branches, whose output volume will increase by 4.4 percent, and output from machine building and metal processing will increase by 6.5 percent. In the fuel and energy complex the extraction of gas will increase. For the complex of construction materials it is typical to have growth of volumes and improvement of the structure of production as a result of higher rates of increase in the output of effective materials. In ferrous metallurgy, for example, the production of economical and efficient kinds of metal products will increase at more rapid rates, which will make it possible to save 13 million tons of rolled ferrous metals in the national economy. In the chemical and petrochemical industry, with an overall increase in production of 5 percent, the production of synthetic resins and plastics will increase by 8.6 percent, soda ash--by 6.9 percent, mineral fertilizers--10.6 percent, and chemical means of plant protection--3.8 percent.

In machine building primary attention will be devoted to increasing the production of machines and equipment which provide for increasing labor productivity in all branches of the national economy. In 1985 there will be a considerable increase in the production of flexible automated production models and systems. The output of automatic manipulators (industrial robots) will increase by 14 percent and will reach 14,300 units.

Progressive technical equipment will be directed primarily toward the fulfillment of assignments of the Food and Energy programs, expansion of the scope of introduction of resource-saving technologies and support for startup projects of 1985, and also technical re-equipment and reconstruction of existing enterprises.

The volume of production of light industry products will increase by 3.5 percent, and goods for cultural-domestic purposes and household use--by 6 percent.

There will be further development of the agroindustrial complex, within whose framework more than 30 percent of the national income will be produced, approximately 95 percent of the food supply will be formed and more than 70 percent of all commodity turnover will be provided. In the modern stage

greater requirements are being placed on the agroindustrial complex. An important role in its development was played by the May (1982) Plenum of the CPSU Central Committee, which adopted the country's Food Program. The main goal of the program is to provide the country's population with food products in the shortest possible periods of time. The average annual production of agricultural products is increasing from year to year. While under the 7th Five-Year Plan it amounted to 83 billion rubles and under the 10th--124 billion, in 1983 agricultural products were produced in an amount of 135 billion rubles, and during 1983-1984 approximately 20 billion rubles' worth more were produced than during the first 2 years of the 11th Five-Year Plan.

In 1985 as compared to 1984 the gross agricultural output will increase by 9 billion rubles, and the entire increase is to be achieved as a result of increasing labor productivity. The decisions of the October (1984) Plenum of the CPSU Central Committee, which adopted the decree, "On the Long-Term Program for Land Reclamation and Increased Effectiveness of the Utilization of Reclaimed Land for Purposes of Steadily Increasing the Country's Food Supply," will also contribute to successful development of agriculture and the agroindustrial complex as a whole. By now the overall area of irrigated and drained land has reached 33 million hectares. During 1986-1990 it is intended to introduce another 3.34 million hectares of irrigated and 3.6 million hectares of drained land, which will make it possible in 1990 to obtain from this land up to 32.3 million tons of grain, including 9.1 million tons of corn, up to 80 million tons of feed units, and up to 22.5 million tons of vegetables from irrigated land. And by the year 2000 the area of irrigated land will be expanded to 30-32 million hectares and drained land--to 19-21 million hectares, with an increase in the production of grain on this land to 55-60 million tons, including corn--up to 18-20 million tons, and feeds--up to 115-125 million tons of feed units.

The earmarked program of land reclamation has been accepted by the workers as a militant task in providing the country's population with food products and, on the basis of this, improving the well-being of the Soviet people.

Responsible tasks have also been set for workers of other branches of the agroindustrial complex, especially "processing products and improving the supply of the population with foodstuffs."

The utilization of secondary raw materials is becoming more and more important. Its volumes as envisioned by the draft of the plan will make it possible to save a considerable quantity of primary resources, including about 50 million cubic meters of wood translated into round timber, more than 80,000 tons of synthetic rubber, more than 100,000 tons of soda ash and so forth.

The role of transportation in the country's economy increases each year. The scope of transportation construction is expanding. During 3 years of the five-year plan more than 1,500 kilometers of new railroad lines and 2,500 kilometers of sidings were constructed and put into operation. Almost 3 million kilometers of railroads were provided with electricity and 7,000 kilometers were equipped with automated blocking. This year the last, the "gold" link of the Baykal-Amur Mainline was installed.

The large new transportation artery is important for the development of our country's economy, especially of Eastern Siberia and the Far East, for the creation of territorial production complexes in these regions, and for bringing rich natural resources into national economic circulation.

The cargo turnover for all kinds of transportation in 1985 has been determined taking into account the earmarked levels of production and volumes of capital construction. The existing network of railroads will be further developed and new ones will be constructed. More than 1,300 kilometers of railroad lines will be put into operation.

Capital construction is assuming a new scope. In the national economy as a whole capital investments will amount to 175.1 billion rubles, of which 90.6 billion rubles will be for construction and installation work. Special significance is being attached to the fuel-energy and raw material branches, and also machine building.

Capital investments in the development of agriculture for the entire complex of work will be in larger amounts than envisioned in the five-year plan for this year. In keeping with the decisions that were made, some of the investments will be used for the development of industries which manufacture equipment and machines for agriculture, the microbiological industry and several other branches.

Capital investments in technical re-equipment and reconstruction of existing enterprises will amount to more than 30 billion rubles. This is higher than the 1984 level and the assignments of the five-year plan for 1985.

New production capacities will be put into operation in 1985, as a result of which the plan envisions the necessary concentration of capital investments, material resources and capacities of contracting construction organizations on start-up projects and the most important carryover projects, which will provide for proportional development of the national economy and elimination of existing interbranch and intrabranh disproportions.

In the final year of the five-year plan a greater role will be played by science and technology in improving the work of the branches of the national economy, increasing their effectiveness, and improving the quality of the products that are produced. The scale of the assimilation of modern new equipment for newly created, reconstructed and technically re-equipped enterprises and industries will be increased.

Comprehensive automation of production will still be the main direction. The Politburo of the CPSU Central Committee, attaching primary significance to this, at its meetings approved measures for acceleration of the automation of machine building on the basis of advanced technological processes and flexible adapted complexes and systems of automated planning, and it has considered the question of the introduction into the national economy of highly productive automated rotor and rotor-conveyor lines. The decisions it adopted regarding these issues constitute a developed program of technical re-equipment of production on a principally new basis. These tasks must be carried out

comprehensively, taking into account the fact that in the creation, for example, of flexible production systems it is necessary to have the immediate and actually simultaneous participation of technologists, programmers, specialists in electronics, robot equipment and software, and specialists in means of diagnosis and automated control. Such an approach places great requirements on the workers of the enterprises, designers and planners.

In the national economic plan for 1985, taking into account the plans of the ministries and departments, it is earmarked to assimilate 4,200 new kinds of machines, equipment, instruments and materials or 7.7 percent more than the 1984 plan, and it also contains about 500 assignments for introducing producing technological processes and means of mechanization and automation of production. There is to be further technological updating of production and increased utilization of progressive resource-saving technologies, including such important base technologies as continuous smelting of steel, the production of cement by the dry method, more thorough processing of petroleum and gas, and comprehensive utilization of raw material.

Measures will be taken for further reduction of manual labor, which envision comprehensive production of systems of machines for mechanization and automation of lifting-transportation, loading-unloading and warehouse work. As a result of the higher technical level of production in industry it is intended to conventionally release about 800,000 people, to transfer more than 400,000 workers from manual labor to mechanized labor, and to obtain a savings from the reduction of production costs of about 5 billion rubles.

The final goal of all the assignments that have been envisioned for the development of the country's economy in 1985 is a further rise in the standard of living of the people. Monetary and real incomes of the population will increase as will retail commodity turnover and public consumption funds.

The volume of services rendered the population will increase by 6 percent, including in rural areas--by 7.1 percent.

From all sources of financing it is intended to construct residential buildings with an overall area of 114 million square meters, which is 10.7 million square meters more than was earmarked by the five-year plan for this year, and for the five-year period as a whole--555 million square meters, or almost 25 million square meters more than envisioned in the assignments of the five-year plan. This will improve the housing conditions for more than 50 million people.

There will be further development of public education, culture and public health. The network of institutions for these branches will expand considerably, and the social and cultural service for the population will improve.

Delivering a speech at the meeting of the Politburo of the CPSU Central Committee, which considered the draft of the State Plan for the Economic and Social Development of the USSR and the USSR State Budget for 1985, general secretary of the CPSU Central Committee, chairman of the Presidium of the USSR

Supreme Soviet, K. U. Chernenko emphasized: "The plan must be unconditionally fulfilled, and where it is possible and necessary--overfulfilled."

Our country's labor collectives have accepted the assignments of the plan of the final year of the 11th Five-Year Plan as an important program of action which is directed toward dynamic and proportional development of the economy, increased effectiveness of public production on the basis of increased return from each invested ruble of material and financial expenditures, each working minute, and the strengthening of planning discipline and responsibility in all areas of administration of the economy, as is required by the modern stage of our development.

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INVESTMENT, PRICES, BUDGET AND FINANCE

AUTOMATION OF GOSBANK OPERATIONS DESCRIBED

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[Text] During the current five-year-plan, the automation of the accounting and calculation being performed in the State Bank of the USSR has received further development. At the present time, the information of many institutions of Gosbank is being processed by electronic computer equipment.

During the 4th quarter of 1983, with respect to the "Operation Day" task alone, more than 79 million documents were processed. The processing of this information is done by on-line operation since its transmission from the institutions of Gosbank to the computer center is effected mainly through communication channels in the mode of dialogue interaction of the operators of the institutions of Gosbank with the computer processing center. The processing is done according to the arrival of the last documents and ends by the end of the current day, and the processing results (extracts from personal accounts and other forms) are transmitted to the user by no later than 7 am of the following day.

The technological process of integrated information processing in regard to accounting and calculation work on an electronic computer has great advantages in comparison with its processing with punchcard calculator (tabulation) and key-operated equipment, which is being used in the information computer systems (IVS) and in the departments of Gosbank. For this reason, there was a transition of accounting and operating information from tabulation equipment to so-called punchcard calculators (SPM) of the Type M-5000, which pertain to computers of the third generation. In the beginning stage of their use, the process of preparing the source information did not in any way differ from preparing the data through the punching of punchcards for their processing on tabulators. The input of information on tasks being solved on the electronic computer, which is realized on the basis of the utilization of an intermediate storage device (the punchcard), creates a number of significant difficulties of a technical and organizational character, moreover it is also uneconomical. Its uneconomical nature consists, in particular, in the fact that the storage device is used only in a single order and requires the expenditure of a large quantity of paper that is in short supply. The punching itself and the input of information from the punchcard require significant labor expenditures to control the correctness of the transfer of the information and its correction.

For this reason, subsequently, with the beginning of the industrial production of the means of preparing information on magnetic media, such as the equipment

for the preparation of information on magnetic tapes (YeS-9002) and systems for the preparation of data on magnetic discs (R-810), developments were begun on the use of such means in the conditions of the Gosbank system.

As a result of the mastery of the technology of data preparation and a number of organizational measures guaranteeing the necessary reliability of the information preparation, equipment for data preparation on magnetic tapes began to be used in departments of Gosbank with a small volume of information, and systems for data preparation on magnetic discs began to be used for information preparation in urban departments of oblast offices of Gosbank and in large departments of Gosbank.

The distinctive feature of the use of this equipment for the preparation and input of information in electronic computers is the fact that the information, which is autonomously recorded on magnetic storage devices, can be processed by electronic computers during the swap of the storage device from data preparation equipment to equipment which is part of the machine. In so doing, the storage devices are utilized over and over right up to their complete physical wear and tear.

For data preparation from primary documents on magnetic discs, the R-810 system is used, which is intended for keyboard data sets and in terms of its functional structure is an autonomous system of information preparation, which secures the input of data from several simultaneously operating keyboards and the accumulation of the information being introduced in the memory on a magnetic disc. The system gives every one of the operators the possibility of the input of records (strings of primary documents) within the limits of 1 to 240 alphabetical and numerical characters and their carry out to a magnetic disc in the zone set aside for every operator. In every sector of the zone of the magnetic disc set aside for an operator, from 1 to 15 records can be placed, with their summary capacity not exceeding 256 bytes. The summary capacity of the surface of a magnetic disc is distributed depending on the number of working operators.

The system secures the arbitrary distribution of magnetic disc capacity among the operator consoles through the preliminary input, in the buffer memory, of contiguous addresses of tracks and sectors of the magnetic disc, which are set aside for the work of every one of the operators, moreover, everyone of them may be allotted quite a number of tracks.

The R-810 System provides for program control of the data input process from a keyboard in accordance with the assigned format of the primary document. The program secures: Control of the data being entered on the basis of control character "digits", "Latin letters", "Russian letters", "information separators", the automatic execution of duplication operations, the automatic execution of throughput operations, the automatic execution of the shift of the indicator in the field to the right with the complement by zeroes from the left, and the automatic check of the data being entered on the basis of the control sum. The program of the record of the data being entered is formed within the capacity of one document and during the work of the operators is stored in the buffer memory in the zone set aside for the work of every one of the operators.

The entry of the program in the buffer memory is effected by the operator from the control console, or by address request of the operator from the magnetic control disc, or by address request of the operator from a magnetic disc of R-412 memory.

Up to 8 consoles with simultaneously working operators may be connected to the R-810 System. The information entered in the R-810 System in independent mode on a magnetic disc is transferred to a Type M-5000 Computer by means of the transposition of the monodisc in the R-412 memory, which is a component part of the machine itself and subsequently, after the appropriate check and correction, is processed in accordance with the "Operation Day" Program.

The technological process of entering information in the computer has become significantly simpler by comparison with the entry of data from punchcards since the labor-intensiveness of information processing on the computer diminished.

After mastering the method of information preparation described above both in the program and organizational respects, the problem of preparing and entering information in the Type M-5000 Computer in the urban institutions of Gosbank was solved to a certain degree. As far as service of the remote departments in the oblasts by the computer center is concerned, it can be noted that, after the transfer from the tabulation equipment of the information computer systems to the Type M-5000 Computer, the process of the transfer and entry of information through communication channels became more perfect, since, in particular, the necessity of the aggregation of teletype with the card punch was eliminated, which was a necessary condition for receiving card punches in the information computer systems (the aggregation was necessary in order to receive card punches on the receiving side during the information processing by means of tabulation calculators). During the transfer of the information processing to the Type M-5000 Computer, the punch card carrier is at once replaced by a perforated tape, and the information that is received through communication channels from the departments of Gosbank, which is punched by teletype on perforated tape, can be directly entered in the computer from the perforated tape with the aid of an input device. As a result, there is a significant reduction in the number of errors in the information that is transferred, since all the errors inherent in the teletype-perforator system aggregation system are excluded.

With the transfer of information processing from tabulation calculator equipment to Type M-5000 Computer, two M-5010 Computers each were installed in the computer centers. The computer centers of 12 oblast and republic (without oblast division) offices of Gosbank were equipped with these machines. After the phasing out of the M-5010 Computers, the centers began to be equipped with two M-5100 Computers; as many as 14 computer centers of Gosbank offices are operating on the basis of these machines.

The M-5100 Computer System (VK) is a further development of small Type M-5000 Computers and represents the model following the M-5010.

The expanded configuration of the M-5100 Computer System, which includes the additional equipment: R-810 System for data preparation on magnetic discs and an alphanumerical printer (ATsPU 128-3M), makes it possible to speed up the solution of the "Operation Day" task.

A complex of programs guarantees the efficient utilization of the technical means, the achievement of their maximum productivity and simplicity of their maintenance, and the improvement of the organization of the solution of tasks.

The programs of the complex are consolidated in a so-called operating system, which is composed of: The control program, the program operation system, program translators and generators, and standard modules.

The complex solves the following tasks: "Operation Day", "Receipt of Inter-Branch Turnover", "Control of Inter-Branch Turnover" at the level of association, and "Statistical Accountability".

The presence of an external memory on removable magnetic discs in the composition of the M-5000 Computer Systems not only increases the efficiency of the information processing [carried out] by them in comparison with the processing of tabulation calculator equipment, but also improves the organization of the storage of large masses of data, simplifies the work in regard to the preparation and check of source information, and reduces the erroneousness in the data processing process.

A special effect is attained in the processing of cash accounting records. As is well known, in the processing of these records by tabulation calculation equipment, the summarized data concerning the balances that have come into being as the result of the turnovers of the sums for the personal accounts of clients, after every solution of the "Operation Day" task, are perforated on punch cards (the creation of balance punch cards), which the next day are processed together with the turnover punch cards. These punch cards are used only a single time.

With the transfer of the tasks to the Type M-5000 Computer System, all summarized data are recorded and preserved on magnetic discs and can be rerecorded on them repeatedly. This makes it possible, in addition, to economize a large volume of punch cards.

The use of tape units in the Type M-5000 Computer System guarantees the long-term storage of individual masses of information and also makes it possible to effect, on the basis of magnetic tapes, the exchange of information between separate systems, and with the appropriate organization of the work--also between computer centers equipped not only with Type M-5000 Systems, but also with YeS computer series.

The institutions of Gosbank receive significant advantages from the processing of information on electronic computers and the use of new technical means in the computer centers. A large contribution to the development of the technical algorithm of the task "Operation Day" and "Receipt of Inter-Branch Turnover" and to the programs of these tasks for the Type M-5000 Computer was made by a small collective of the computer center of the Penza Oblast Office of the USSR Gosbank. The specialists of this center--V. R. Sadovskiy, L. A. Zhogova, and

others--not only were the authors of the development of the programs, but also took an active part in their introduction in other Gosbank offices, extending skilled advice at the local level.

However, in talking about the positive factors in the introduction of small Type M-5000 Computers in Gosbank, it is impossible not also to talk about some negative aspects. The point is that the disc units that go into the M-5000 Computer, in particular the monodiscs (cassettes), have a low reliability. The Vil'niyus Sigma Production Association for Computer Equipment, which produces them, does not guarantee the delivery of the necessary quantity of such information carriers to the consumers, and for some incomprehensible reason it has stopped accepting the monodiscs that have failed for repair and recoating. This circumstance makes the normal operation of the Type M-5000 Computers more difficult and can lead to service of insufficient quality to economic organizations by the institutions of Gosbank.

It follows from what has been stated that the transfer of banking institutions to automated information processing on the basis of small Type M-5000 Computers, with the replacement of tabulation calculator equipment, produces a definite effect. The efficiency of the use of these computers can be even higher if measures are taken with respect to the more extensive transfer of the institutions of Gosbank to service by computer centers, the reserve of computer capacity of which exists in the majority of cases.

The delivery of information over long distances from the remote institutions of Gosbank to the processing center and back remains a problem. This holds back the acceptance of a large number of departments subordinated to a given office for service by the computer center. Analysis shows that in regions, where good transportation service is available, the number of accepted Gosbank institutions is higher in the oblast. For example, the Kaliningrad Oblast Office of Gosbank secured the complete information processing transfer of all Gosbank institutions in the oblast.

The method of the delivery of information through telegraph communication channels, with the use of perforated tape, which is presently being used in computer centers equipped with Type M-5000 Computers, has significant shortcomings--although it is more perfect by comparison with the preparation of information on punch cards. First of all, an intermediate information carrier--the perforated tape--is again required, and, secondly, the control, adjustment and correction of the information entered in the computer are in this case difficult and require the participation of special personnel for adjustment, both in the department of Gosbank and in the computer center. The adjustment problems consist in the fact that it is practically impossible to operationally establish a telephone or other link between the adjusting sides since the source documents are located in the department of Gosbank.

For the time being it does not seem possible to organize a system for the transfer of data through communication channels from Gosbank departments directly to a Type M-5000 Computer because of the lack of output, by industry, of the technical means of interfacing these machines with communication channels, which secure the efficient transfer of information, taking into account the banking conditions of its processing. For this reason, the specialists of Gosbank are

confronted with the task of creating a system of the automation of banking operations which would meet the specific features of the processing of banking operations to a greater degree. With this in mind, work is being done in the State Bank on the creation of a sectorial automated control system (OASU of the USSR Gosbank). Taking into account the fact that this subject is too vast, we touch only on part of this problem as most important for the State Bank, and that is the creation of the means and the system of data transmission over long distances.

In the system of Gosbank for data transmission over long distances, extensive use is made of the telegraph communication network. In so doing, the telegraph sets are used as terminal devices for computers in the departments of Gosbank. In the computer center, the channel is interfaced with the aid of specialized equipment directly with the computer. Special programs secure the transmission of data with the simultaneous control of subjective errors of the operator, hardware-controlled and channel errors.

Telegraph channels are leased at the enterprises of the USSR Ministry of Communications. The telegraph sets and the apparatus for interfacing the communication channels with the computer are under the jurisdiction of Gosbank.

The experience of the work has shown that, for a whole series of reasons, the telegraph set does not meet the specialized requirements for the processing of banking information in view of the fact that it lacks, in particular, the ten-key numerical keyboard, which could be used by operators with data sets on non-cash transactions by the "blind" method, which doubles the speed of data sets.

At the present time, special hardware has been developed for the teleprocessing of data of the USSR Gosbank sectorial automated control system. A short characterization of this equipment is as follows: The hardware (KTS) for teleprocessing of USSR Gosbank sectorial automated control system data is intended for the organization of long-distance input-output formatted banking documents from the institutions of the bank through communication channels with automated processing of banking information and for the concentration of information flows and their subsequent transmission to the processing centers from oblasts which do not have their own computer centers.

The composition of the hardware includes: Group equipment for the interfacing of the centers (GAS-ts), a concentrator, a terminal for cash operations (T₁) and a terminal for non-cash calculations (T₂).

The programs were written in the Assembler-K language. The interface of the concentrator with the telephone communication channel is secured through a special device (linear adapter), which permits the simultaneous transmission and reception of data between the concentrator and the communication channel through a standard modem in code-independent mode with operating speeds of 600, 1,200, and 2,400 bauds.

Taking into account the fact that the telegraph communication network being used in Gosbank at the present time cannot be instantly replaced with terminals, as well as the fact that in departments of the bank with a small volume of

information--up to 1,000 to 2,000 documents--it is economically inexpedient to utilize group complexes of equipment for the transmission of data, the use of teleprinters is envisaged in the system that has been developed.

Using the concentrator as a remote terminal multiplexer, the computer centers organize the data acquisition through telegraph channels of communication from teleprinters set up in the departments of the bank, with the transmission of data in multiplex mode of communication of every subscriber between the concentrator and the computer processing center through a telephone channel. In this case, data transmission network is built as follows. From the building of the rayon department of the bank to the concentrator, installed, for example, in the city department of the oblast office of Gosbank, a telegraph communication channel is used, and from the concentrator to the processing center, housed in the association [kustovoy] computer center, a telephone communication channel is leased. The utilization of such a two-stepped communication network is called forth by the most economical construction of the data transmission system, on the one hand, and, on the other, the radial structure of the communication network was taken into account.

The connection of the telegraph channels to the concentrator is effected through the interface device. It secures the simultaneous and independent (of the work of the connected terminals) exchange of data through as many as 8 telegraph communication channels. The communication channel is a four-wire channel, which includes a line for reception and a line for transmission (sub-channels). The mode of exchange for every channel is duplex or semi-duplex.

The protection of the information during its transmission through the communication channels is effected through the control of the information blocks being transmitted in accordance with a special polynomial and the control of requisites [rekvizity] of the banking documents being transmitted in accordance with a special key. Through this the necessary level of reliability in information transmission is attained (not more than 1 error per 10^6 characters being transmitted, with a coefficient of errors in the channel for bits not exceeding 10^{-4}).

On the receiving side in the computer center, the installation of a separate modem, securing the conversion of linear to discrete signals, for every channel connected to the system is not required. This function is performed by the group apparatus for signal conversion.

In the group equipment for the interfacing of centers (GAS-ts), intended for the organization of information exchange between computer systems of the processing centers of the Gosbank sectorial automated control system and the terminal equipment of the lower-link institutions, the functional control of the serviceability of the equipment is envisaged as the multiple testing of the data transmission sections, as well as the testing with the use of loops on the level of the linear adapter, the signal conversion device, and others. The testing is accomplished automatically in accordance with program demands or in accordance with signals of the operator console.

The program of the group equipment for the interfacing of the centers [GAS-ts] are built on the base of a system of commands of the concentrator with the use of the same machine-oriented language.

As is apparent from the adduced characteristics, the equipment system for the transmission of data functionally secures the entire technical process of transmission from the moment of the typing of the information on the keyboard of the terminal to its entry directly into the computer, as well as the reverse output of data both for visual perception and documentation (list output) on paper tape.

The direct access of the operators from the terminals to the computer through communication channels and the work of every operator, which is not related to the activity of the others, secure the processing of the information in a real time mode.

The given equipment does not exclude, of course, the use of drum-type telegraph sets of Type T-63 and RTA-80 as terminal devices. For this a special modification of the telegraph concentrator has been developed, which secures the connection to 32 telegraph duplex channels. The given concentrator is installed directly in the computer center when a teletype connection is organized from the bank departments of the oblast center, in which the computer center is housed, and for servicing the departments of the bank of a neighboring oblast, this concentrator may be installed directly on the premises of the office being served by the computer center. In this case, the communication network is organized in the following way: The telegraph communication channels of the bank departments of the office are connected to the concentrator set up in the same office, and the concentrator itself is connected through the allotted telephone voice frequency (TCh) channel, or a physically connected line to the group equipment for the interfacing of centers (GAS-ts) housed in the computer center. The organization of such a connection secures the reduction of the number and length of the telegraph communication channels and is entered into the existing structure of the communication network.

The technical means of teleprocessing of data are built in accordance with the module principle; this secures the possibility of the most advantageous adaptation of the equipment to the conditions of concrete use.

The structure and composition of the technical means of the teleprocessing of data are determined by proceeding from the number of documents being received in the institutions of Gosbank. In the course of one shift, 200 documents can be transmitted from one work station with a T1 terminal, in a shift with a T2 terminal--1,000 documents. From a teletype 800 documents are transmitted per shift.

Institutions with a large volume of documents (city departments and others) are equipped with peripheral hardware (PKTS), the composition of which is supplemented with 1 concentrator, 3 T1 terminals, 5 T2 terminals, 1 input-output perforated tape device, 3 documentation devices, 1 modem, 1 alphanumerical printer, and from 1 to 8 telegraph sets. The exchange of information with such institutions is effected through standard voice frequency channels or physically connected lines.

The first project, where the experimental, and then industrial, operation of the equipment for the teleprocessing of data of a Gosbank sectorial automated control system was begun was the experimental zone on the basis of the multi-use computer center of the Belorussian Republic Office of the USSR Gosbank that has been created.

In this center two complexes of group equipment for the interfacing of centers (GAS-ts) have been installed, which secure the reception and translation of communications of the entire Minsk area, which includes the Minsk city and oblast offices of Gosbank, as well as the Brest and Grodno oblast offices.

For the city department of the Minsk Oblast offices, peripheral hardware was installed in the building of the multi-use computer center, and for the city department of the Minsk city office two peripheral hardware facilities were installed in the building of the Belorussian republic office. The volumes of information processed daily in these offices come to 3,000 to 4,000 and 10,000 to 13,000 documents respectively.

Peripheral hardware has been established in the Molodechno and Borisov departments of Gosbank, as well as in the city departments of the Brest Oblast office, whose information is daily processed by the Minsk Computer Center and amounts to 6,000 to 8,000 documents.

To secure the long-distance processing of information of the departments of the Minsk Oblast office, the necessary number of telegraph concentrators has been installed in the center, through which interactive communication operators of the departments directly with the computer is effected.

In the departments of Gosbank, drum-type telegraph sets have been installed which are connected by telegraph communication channels with the multi-use computer center, which make it possible, along with direct input, to execute reverse data transmission at a telegraph speed of 100 bauds.

By the end of the first six months of 1984, 25 Gosbank institutions were transferred to service by the multi-use computer center of the Belorussian republic office of Gosbank.

The equipment for long-distance data transmission installed in the multi-use computer center and in the Gosbank institutions of the Belorussian office, in the course of its 2-year long operation, has shown that it meets the basic requirements of the automated processing of banking information with respect to accounting and operational work.

The service of the bank institutions of the Brest Oblast office by the Minsk Computer Center indicates that the given equipment secures the long-distance processing of information, which is transmitted by communication channel over a long distance. The transmission and processing of the indicated information can be effected within the assigned time, and they have the necessary degree of reliability.

For the technical maintenance of the concentrators with terminals installed in the Brest Oblast office, a small staff--a total of 3 persons--was required. For comparison, it may be said that 45 persons are engaged in the maintenance of the computer center of the Vitebsk Oblast office, which is equipped with a punchcard calculator system of the Type M-5000 and processes approximately the same volume of information (8,000 to 10,000 documents). (In so doing, of course, share of the maintenance personnel of the Minsk Computer Center is not taken into account).

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ECONOMIC MODELING AND COMPUTER TECHNOLOGY APPLICATION

MONOGRAPH ON MATHEMATICAL METHODS, MODELS REVIEWED

Moscow EKONOMIKA I MATEMATICHESKIYE METODY in Russian No 6, Nov-Dec 84 pp 1151-1153

[Review by B. P. Suvorov of the book "Ekonomiko-matematicheskkiye metody i modeli v perspektivnom atraslevom planirovanii (Voprosy metodologii i metodiki), Novosibirsk, Nauka, 1982, 428 pp]

[Text] The monograph being reviewed generalizes the results of a large cycle of research work by Siberian scientists on the application of mathematical methods in branch planning, which has been conducted intensively in the IE OPP since the beginning of the 1960's. It was preceded by numerous publications which consistently attracted the attention not only of workers in the area of optimization of branch planning, but also practically all people who are interested in questions of the utilization of computer equipment in planning calculations. Along with the well-known work of A. G. Aganbegyan, A. M. Alekseyev, V. V. Kuleshov, D. M. Kazakevich and others, deserved authority has been given to the "Methodological Provisions for Optimal Branch Planning in Industry" (Novosibirsk: Nauka, 1972) and "Basic Methodological Provisions for Optimization of the Development and Distribution of Production" (Moscow, Nauka, 1978), on which the results obtained by the authors of the monograph were also based.

This book shows the progress in the area of theoretical and applied research on problems of applying mathematical instruments in branch planning. Its title reflects only the overall direction of the monograph; the content is essentially broader and embraces questions not only of modeling in long-range branch planning, but also the theory of multilevel systems, multicriterial optimization, the target-program approach, analysis of interbranch interconnections, man-machine interaction, the methodology for the construction of the ASPR and a whole number of other aspects of improvement of planning activity.

Highly typical in this respect is Chapter 1 which gives a general description of the condition and problems of improving models and methods of optimization of branch systems at the present time. Along with the conceptual apparatus that is introduced here with the necessary clarity and concreteness, on the whole the authors have presented the problems of mathematical modeling of economic systems, defined not only by the modern condition of the theory and

practice of calculations on the basis of models, but also by the need for including them in the technology of planning calculations. In particular, they formulate the requirements which are placed on economic and mathematical models in order to provide the necessary quality of the plan that is received on the basis of these. This part of the chapter, along with a discussion of the factor of the indeterminacy in the practice of modeling from a methodological standpoint, is especially attractive.

Chapter 2 presents the principles of the construction and utilization of multilevel systems of modeling. As a synthesizing formation it considers the two-level model of optimization in which on the upper level one constructs a network schedule of branch economic programs, and on the lower level--an optimized model of linear programming. The upper level forms and optimizes the resource-target composition of the branch program, which is concretized by indicators of the dynamics of the output of products in the products list and the allowable level of utilization of limited resources. These assignments are exogenic for the lower level, where the optimization model describes the condition and possibilities of the development of the branch system. It envisions the coordination of models of both levels in terms of the composition of the consumed and transmitted information. In turn, in order to form the internal conditions for the functioning of the branch system, a two-level model is also proposed, which consists of the branch model (upper level) and models of production facilities (lower level). An exchange of information is organized between them: from above to below one transmits indicators of the effectiveness of products, and from below to above--methods of functioning which make it possible to improve the plan for the development of the system according to the accepted criterion.

A model-generator is thus introduced, which is intended for automated formation of information and which contributes to increasing the completeness and reliability of the initial data, to unifying the processes of planning and developing, and to addressing the developed plan to a particular party.

The authors have also investigated certain approaches which realize the designing of multilevel systems through synthesis of two-level models.

In spite of the fact that when considering the multilevel approach they introduce a number of examples related to modeling the development of the petroleum extraction industry, this part of the monograph still suffers from a certain schematism. Moreover, the specific features of the given branch make it necessary to analyze in detail the peculiarities of the specific object, but at the same time this makes it more difficult to understand the fundamental principles of the multilevel approach. Having in mind the methodological direction of the book, it would be expedient, in our opinion, to illustrate the theoretical points and the proposed algorithms by a comparatively simple conventional example as is frequently done, for example, in Chapter 3, which is devoted to multicriterial optimization.

Of special interest here is the elucidation of problems related to the formation and coordination of global and local criteria for optimizing long-range planning (Section 1).

The statement of multitarget problems and a generalized description of the algorithms for solving them are given an excellent presentation which can be recommended as a model of a well-thought-out and structured approach to multicriterial optimization. But the design part of Chapter 3 is essentially not coordinated with the problematic of optimization of the development of branch systems. In particular, practically no attention is paid to the factor of the whole-number nature which is typical of the majority of problems with the selection of plans for construction and reconstruction of enterprises. The necessary methodological recommendations for selecting a method of multicriterial calculations for various cases which the reader might encounter are replaced by a survey, and the selection of the method of indirect limitations is considered more completely and illustrated with an example which is never substantiated.

Chapter 4 is devoted to the development of target-comprehensive programs for the development of branches and branch systems. The authors propose a system of models which is based on stratification of the selected object and the utilization at each level of the models of a type which corresponds to the greatest degree to the needs of the development of the program. The content of this chapter, to a certain degree, amounts to a concretization of the overall approach that is presented previously when describing multilevel systems of models (Chapter 2). It is based on the experience accumulated by the IE OPP in solving applied problems in long-range planning in a number of branches in industry, the development of a multibranch cross-section of regional programs of various types and the optimization of program construction of the complex. The authors have taken the path of generalization of this experience, having made an attempt to describe the procedures for the coordination of calculations for the systems of models with respect to typical situations. But this attempt is not always successful. Thus questions of modeling branch systems are considered using the example of the gas industry, geological prospecting and the petroleum and gas construction industry. The selection of the branch is unsuccessful because of its specific features: suffice it to say that the model of the lower level which is described in detail is based on hydrodynamic calculations. But this is not the main thing: it is more important that here they have not made any attempt to surmount the specific features and move on to the level of generalizations. As a result the integrity of a chapter which occupies one of the key positions in the monograph has suffered.

This shortcoming is made up for to a significant degree in Chapter 5, which gives an overall schema for the optimization of multibranch complexes. The description of the schema is augmented by a system of models of branches of the petrochemical complex (including petroleum extraction, petroleum processing, gas processing and petrochemistry) and the consideration of problems pertaining to an analysis of interbranch and intrabranch ties of the complex of the timber and wood-processing industry. The results of this research which was conducted by the IE OPP has become widely known because of a number of publications which preceded the publication of the book under review. Here they are presented in compact, almost summary form.

An unquestionable success of the collective of authors are Chapters 6 and 7, which contain an economic and mathematical analysis of the solution to

planning problems. The extremely clear-cut presentation, the strict consistency and the use of illustrative examples--all this provides for a combination of weightiness of the material that is presented and its accessibility. In Chapter 6 they characterize the areas of investigation of the effectiveness and stability of solutions to optimization problems and show the possibility of utilizing methods of analysis for coordinating planning decisions in the territorial-branch system using the example of determining an efficient composition and scope for the development of branches of production in the rayons.

Methods of studying the reliability of planning decisions, taking into account the qualitative indicators, are given in a separate chapter. This is an extremely important addition to the analysis of optimization calculations, which are of independent significance. The discussion is about the need to account for the indeterminacy and probability of information about the future development of branch systems, that is, factors which give rise to the need to evaluate the reliability of the plan or, in the definition of the authors, the degree of confidence in carrying out the decisions contained in it. The potential probability of its fulfillment in terms of one indicator or another has been taken as a quantitative measure of the reliability of the plan.

Of special interest are the author's proposals concerning the calculation of functions of elasticity of planning decisions, which reflect the relative degree of achievement of the final goal, depending on the input parameters. Here they set the task not only of analyzing the proposed variant of the plan for its elasticity, but also the construction of a plan with a given elasticity in terms of the basic indicators.

With respect to one of the classes of problems under consideration they suggest a dialogic procedure of optimization which is intended for enlisting experts to evaluate the plan for the development of the branch system, taking into account the qualitative characteristics.

Chapter 8 discusses the results and areas for introduction of economic-statistical models (ESM) in long-range branch planning. The practice of their utilization is analyzed in order to reveal the possibilities of improving the methodology for optimization of complicated branch systems. The first steps in the application of the ESM are related to their role as information models which make it possible to expand the set of initial variants for problems of branch optimization. Subsequently ESM's are included directly in the multilevel systems of optimization where, along with presenting information, they contribute to the process of coordinating planning decisions. The book gives a diagram for the functioning of the models of economic indicators of the operation of the enterprise in the system of models, for optimal territorial and production planning which was developed in the IE OPP.

A considerable amount of attention is devoted to questions of the adequacy of statistical models, which means the correspondence of the results of modeling to the changes and ratios observed in reality. In this connection they analyze such frequently encountered peculiarities of actual economic data as the heterogeneity of the totality of objects investigated, the small volume of selection, the frequent changes in the conditions for the functioning of the

objects, the existence of a priori limitations on activity, and so forth. Therefore they seem to draw a correct conclusion concerning the need to create various ESM's with given properties which reflect the peculiarities of the actual economic processes. A large part of the chapter was devoted to methods of synthesizing these models.

The problems of applying methods of statistical imitation modeling in branch planning which are considered here also touch upon this problematic. These methods make it possible to establish ties between the possible changes in the input variables and the results of the solutions to optimization tasks. These methods make it possible to establish a link between the possible changes in input variables and the results of solutions to optimization problems. Thus one forms an area of probable variation of the optimal decision, which provides additional information for its analysis and adjustment during the process of management. The applicability of the methods of the imitation approach are investigated, in particular, using the example of the utilization of methods of planning the experiment when determining the influence of various factors on the optimal plan on the basis of solving optimization problems related to the development and distribution of ferrous metallurgy in the USSR in the future.

It should be noted that on the whole Chapter 8 presents a number of interesting methodological points (the peculiarities of the improvement of methods for optimization of branch systems, principles of synthesis of hybrid models and so forth). They are studied with respect to the ESM, although they are more universal in nature and could be placed in the part for generalities.

The book is given its monographic finalization by the chapter which is devoted to including economic and mathematical models of branch systems in the technology of planning calculations. The authors have managed to reveal those difficulties which now stand before the organization of branch planning on the basis of modern economic and mathematical instruments. In their discussions they proceed from the need for standardization of the technology for the development of branch plans (with the inclusion in it, in each concrete case, of the specific features of the branch that is being investigated).

The model apparatus is considered as a language for describing formalized planning and economic problems (PEZ) of technological systems of planning. To do this they introduce the concept of "consumer quality" of models, which means their capability of satisfying requirements of the PEZ's that are suggested for implementation. In the final analysis they synthesize a design which has been given the name the model of the technology of planning calculations. The latter integrates the technological aspect of planning, its informational and organizational basis, the adaptive model apparatus, and control over the course of development of plans.

The authors essentially suggest their own approaches to solving the extremely important problem related to increasing the return from the accumulated arsenal of economic-mathematical models and methods of optimizing branch planning. In the modern stage there is an objective need not only for further development of questions of economic-mathematical problems per se; a no less important object of research is the creation of the methodology and methods

for the application of the corresponding methods and electronic computers in planning, and their extensive adaptation to the real conditions for the development of long-range and current plans for the economic and social development of the country. Only then is it possible to expect serious acceleration of the introduction of new instruments into the practice of planning under the conditions of the functioning of the ASPR and OASU. It would be extremely expedient to continue research in this direction.

On the whole one can conclude that the publication of the monograph under review is an important phenomenon which characterizes the modern achievements in the area of the development of instruments for modeling branch plans.

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REGIONAL DEVELOPMENT

KAZAKH SSR ECONOMIC DEVELOPMENT PROBLEMS EXAMINED

Economic Development Analyzed

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 10, Oct 84 pp 102-105

[Article by E. Turkebayev, doctor of economic sciences and director of the Scientific Research Economic Institute for Planning and Normatives under the Kazakh SSR Gosplan: "Problems in the Economic Development of Kazakhstan"]

[Text] The economy of Kazakhstan is an important component of the country's national economic complex. It has achieved much during past five-year plans. There was an increase in the production of industrial and agricultural output, the capital construction industry, transport, and communications developed rapidly, the well-being of the population improved, and its cultural level rose.

Kazakhstan now produces more than 62 billion kilowatt-hours of electric power, 1.321 million tons of mineral fertilizers, and a large quantity of diverse industrial and agricultural production. In 1980, Kazakhstan's nonferrous metallurgy alone produced 49 production descriptions, whereby most of them were released to the market with the State Emblem of Quality. There is also a large volume of production of coal, iron ore, sulfuric acid, and mineral fertilizers. The republic has significant reserves of asbestos, fire-resistant clays and dolomite.

The Kazakh SSR has great possibilities for the production of agricultural output.

The presence in the republic of reserves of mineral raw materials as well as agricultural resources, its favorable territorial position between the country's largest regions including the Center, the Urals and the vast Siberian Zone and the republics of Central Asia, and an increase in the population and labor resources almost double that of the average indicators for the union are all evidence of the favorable conditions for the accelerated development of the productive forces of the Kazakh SSR.

In working out a scheme for the development and distribution of the productive forces of the Kazakh SSR with consideration of the natural economic factors of the republic, ways have been found to solve the most important problems of scientific-technical progress in the republic, to make more effective use of mineral raw materials, to improve the development of the leading production sectors, and to improve the structure of the republic's public production.

An important place among the main questions involved in raising the efficiency of the development of the national economy of Kazakhstan is devoted to the development of the sectors of the fuel and energy complex, especially the coal industry. The Kazakh SSR holds third place in the All-Union mining of coal. The republic has 9 percent of the All-Union reserves of coking coal and almost 20 percent of the power coal.

In the long term, it is expedient to maintain the achieved level of mining of coking coal in the Karaganda Basin, which will make it possible to ensure the reliable provision of the metallurgical industry of Kazakhstan and in part of the Urals as well. The increase in the production of coking coal is mainly being achieved through the complete and efficient modernization of the operating mines and their conversion to a higher level of overall mechanization and automation of labor as well as by raising the enrichment of coal to 100 percent.

The Ekibastuz Coal Basin is developing at a rapid rate. It is located near the industrial regions that are experiencing a fuel shortage.

Calculations show that the increase in the production of power coal in Kazakhstan is not meeting the growing demand for coal. In this connection, the need arises to develop the coal deposits of the Turgayskiy Basin, the closest basin to the Urals, the main coal consumer. It is expedient to begin its development at the Orel Cut. It is also expedient to increase the mining of coal at the Borlinskiy and Sokurskiy deposits, at the Maykyubenskiy Basin, and at other smaller sites.

The development of the coal-mining industry will permit the accelerated formation of the energy base through the assimilation of a series of highly efficient GRES [state regional electric power stations] in a complex with a new GES [hydroelectric power station] under construction in western Kazakhstan (on the Irtysh) and with the Semipalatinsk GES. All of this will ensure a high level of electrification and centralized district heating in Kazakhstan and will permit the simultaneous transmission of electric power to the regions of the country's Center over a unique high-voltage line of direct current at 1,500 kilowatts extending 2,440 kilometers from Ekibastuz to the Center and over the 1500-kilowatt line from Ekibastuz to the Urals as well as others.

In the long term, with the growth of new explored reserves and the application of the newest methods in extraction--methods such as the staged application of hot water as well as the fire method and other means of raising the petroleum yield--it becomes possible to increase the production of oil. Simultaneously in the coming years in western Kazakhstan, it will be expedient to establish a large base in the country for the extraction of casing-head gas and on this basis to develop the output of organic synthesis. The volume of petroleum refined can be increased in the republic through the use of western Siberian oil at the Pavlodar and Chimkent refineries as well as the reconstruction and expansion of the Guryev Refinery and other measures.

In the long term, the mining industry in the republic will grow at a rapid rate. To a considerable degree, this is determined by the formation of a very large phosphorus base in the Karatau Chemical Basin and also by the increase in

the mining of phosphorus raw material in Aktyubinsk Oblast. The ore-mining industry will have to develop new regions for the mining of the ore of ferrous and nonferrous metals in the Uspenskiy Ore Zone and in a number of other regions of the republic.

In speaking of the special features and economic problems involved in the development of the mining sectors of the industry of Kazakhstan, one should dwell on the questions of increasing the overall use of raw materials and the utilization of wastes in ore production. This problem becomes more urgent with the accumulation of unprocessed wastes. By 1 January 1983, their volume in the republic reached almost 11 billion tons, including 9.12 billion tons of rubble, 1.47 billion of products from enrichment processing, 100 million of slag from metallurgical production, 156 million of ash and slag wastes of electric power stations, and 34 million tons of other wastes. In addition, they stored up to 120 million tons of ore not meeting quality requirements, ore that can be used in the future. In 1983, of the entire volume of accumulated wastes in the republic's economy, only 4.3 percent of the rubble, 14.4 percent of enrichment residues and 40 percent of metallurgical slag were used.

If there is not an increase in the utilization of wastes, their volume may more than double in the next 15 to 20 years, and the area that they occupy will exceed 109,000 hectares.

The republic has already accumulated experience in using these wastes. Just through the full utilization of raw materials, the enterprises of nonferrous metallurgy have mastered the production of more than 20 types of new output over the last 10 years. Thus, at the Ust-Kamenogorsk Lead and Zinc Combine imeni Lenin and at the Balkhash Mining and Metallurgical Combine, the value of incidental output reached 50 percent of the value of total output, and it was 30 percent for the sector as a whole.

Calculations show possibilities for a significant increase in the utilization of these wastes, including up to 13.4 percent (by a factor of almost six) for rubble, up to 34 percent, or a factor of almost five, for enrichment residues, and by a factor of more than five for metallurgical slag. For this purpose, it is necessary to construct more than 30 new large-scale processing enterprises and shops, not counting projects of the sectors of union subordination (coal, electric-power, chemical and other industries).

Ekibastuz coals have the lowest production cost of mining in the country (2 rubles, 59 kopecks), and mining costs are one-fifth to one-fourth of the transfer prices, which ensures a large profit every year. It is thought that it would be fully justifiable to allocate an additional part of it to a system of environmental protection work.

There are also significant reserves for further development of Kazakhstan's metallurgical industry. Thus, in the ferrous metallurgy of the republic, it is expedient to bring about the strengthening of the ore base of the metallurgical production of Ural plants and the full provision of the Karaganda Metallurgical Plant with cheap ores from the Lisakovsk Deposit with a significant improvement in the quality of ore preparation.

It is expedient to increase significantly the volume of production of commodity ore at facilities being newly constructed or developed, including the Kachar and Lisakovsk ore-enrichment combines and the Yuzhnyy Sarbay, Kurzhunkul', Kentyube and a number of other deposits. It is proposed to increase the mining of chromite and manganese ores, to expand the production of high-quality refractory materials, etc. The production of iron alloys will be developed.

In examining the further development of the metallurgical complex, one should first of all take a look at ferrous metallurgy. Calculations have established the high effectiveness of the construction of a plant in the region for the production of tubing, of a significantly expanded production of structural metal, and of the construction of a new processing plant for high-grade steel. The necessity of developing tubing production is conditioned not only by the large scale of the output of sheet metal but also and most importantly by the continually growing demand of the national economy of Kazakhstan and the republics of Central Asia for tubing.

Annually in the Kazakh SSR, they are already constructing about 1,000 kilometers of water mains and 1,000 kilometers of their distribution network, hundreds of kilometers of main product lines and their local networks as well as gas and oil pipe lines. In 1980 alone, the overall importation of tubing into the Kazakh SSR reached 1.2 million tons (without considering the growth of at least equal proportions in the demands of the republics of Central Asia). As calculations show, almost 2 million tons of tubing will be needed during the next three or four five-year plans for construction in water management (irrigation and watering of pastures). The average annual cost of transporting this tubing will exceed 10 rubles per ton, according to calculated expenditures. It seems to us that tubing production should be established in the republic itself.

The proposals worked out by GIPROMEZ [State Union Institute for the Planning of Metallurgical Plants] for the development of ferrous metallurgy foresee a reduction in the production of structural steel at the Karaganda Metallurgical Combine, from which the republic now receives up to 500,000 tons of metal a year for construction and repair needs. Consequently, there will again be a sharp increase in the transport of this metal over many thousands of kilometers from the Urals, the Center and the Ukraine against the continually growing reverse exportation of scrap metal.

The republic's metal stocks, requiring continual renewal, have already exceeded 85 million tons. Therefore, the question arises about the construction in the republic of a plant for quality steels. However, this question as well has already been studied for many decades by GIPROMEZ with no final solution having been found.

The republic's nonferrous metallurgy has good possibilities for increasing the production of heavy and especially of light metals, above all aluminum. At the republic's nonferrous metallurgical plants, there is now a broad effort under way to incorporate the latest technology and equipment (underground and compact leaching, oxygen-weighted smelting, smelting in a liquid bath with oxidizing fluming, etc.). At the same time, it is necessary to solve a number

of serious questions. Thus, for example, it is impossible to assent to the calculations of the planning institutes of the USSR Ministry of Nonferrous Metallurgy on limiting the development at a number of enterprises of Kazakhstan's nonferrous metallurgy of fourth reprocessing (production of rolled metal), which is motivated by the presence of unused capacities at other enterprises of the country.

Considerable attention is being paid to accelerating the development of machine building enterprises in the republic. The relative importance of machine building in the sectorial structure of the industry of the Kazakh SSR lags substantially behind the All-Union average level, which has a negative impact on the resolution of questions involving the acceleration of mechanization and automation of labor in many leading sectors of production.

At the present time, measures are being taken to speed up the development of machine building in the Kazakh SSR. During the years of the 10th Five-Year Plan, the rate of growth of machine building output was almost twice that of industrial production. In the years 1961 through 1980, the production has been mastered for about 600 kinds of new machine building output, and 25 kinds began to be produced for the first time in the USSR. Agricultural machine building was developed at an accelerated rate, as a result of which significant successes have been achieved in virgin-land and irrigated farming. The level of overall development of machine building is still insufficient, however. To a large extent, this is explained by the dispersion of enterprises in many subsectors of machine building. It is also necessary to improve the planning by sectorial ministries of the products list with consideration given to meeting the needs of the republic.

At the present time in the republic, there are a few plants whose output is consumed locally. These are the associations Kurgormash, which supplies mechanisms for the mine shafts of Karaganda; Vostokmashzavod imeni 50th Anniversary of the USSR, producing self-propelled machinery for nonferrous metallurgy; and the Ustinoograd Association for Antierosion Equipment. They all produce output as good as any from foreign countries.

From our point of view, the intensified specialization of the largest machine building plants through the establishment of their branches can provide for a substantial improvement of the situation.

In the complex of questions in the development of the republic's economy, an important place is assigned to the improvement of the agroindustrial complex of Kazakhstan and above all of its material and raw materials base and to a more efficient management of agricultural production. A complex of measures has been worked out providing for stable harvests and the expanded production of feed.

To ensure the production of 1.7 to 1.8 tons of grain per capita and 90-95 kilograms of meat per capita annually, it is essential to provide the republic's agriculture with a stable water supply, especially in its southern regions. The water shortage in the Kazakh SSR is becoming more acute in connection with the increase in the area of plowed lands in virgin-land regions and with the application of farming systems based upon deep tillage and intensive snow retention. In

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southern regions, irrigated farming is developing intensively, which limits natural flows of water into small and medium-sized rivers and consequently brings about a fall in the level of large rivers and natural reservoirs. As a result, the ground-water level declines in contiguous regions and the lands become more prone to drought.

Over the last 20 years, for example, the level of the Syr Darya, and accordingly of the Aral Sea as well, fell significantly. Thus, the level of the Aral Sea fell by 9.2 meters. This uncovered a surface area of 2 million hectares, equal to that of such a large reservoir of the republic as Lake Balkhash. There has been a reduction in the volume of water flowing into the Aral Sea by means of the Amu Darya because of an increase in new irrigation blocks in its upstream areas. There is also a worsening of water supply systems of other rivers of interrepublic importance in southern Kazakhstan—the Chu, Talasa and Assy rivers. As a result, many dozens and hundreds of kilometers of surrounding lands are being subjected to drought.

There are plans in the republic for the accelerated formation of the industry of the construction complex and the building materials industry and for the development of transport and communications as well as social institutions and projects in the nonproduction area. For this purpose, it is essential to have more effective specialization and production cooperation, improve the distribution of enterprises, accelerate scientific-technical progress, etc.

In the system of the most important measures to raise the efficiency of the republic's public sector, a special place is occupied by the improvement of transport and economy ties that are largely dependent upon the level of branching of Kazakhstan's transportation network. A number of very important measures are being carried out in this direction in the republic. Work is already being completed in the Kazakh SSR to construct asphalt-surface roads to all central farmsteads of kolkhozes and sovkhozes. A program is being put into effect for the construction of roads to sovkhoz departments.

At the same time, there is no unified railroad network in the central regions, which worsens transport and economy ties. Such large developing oblast centers of Kazakhstan as Arkalyk and Dzhezkazgan have no through routes, which complicates their ties with many of the nearest rayons of the republic. This connection is achieved through long circuitous routes, which makes difficult the coordination of interoblast transport and economy ties and the organization of the shortest shipments of many important types of freight between the northeastern and southwestern parts of Kazakhstan. In this connection, complications arise in the reciprocal exchange and delivery of building materials, coal, timber, agricultural output and other national economic shipments.

The resolution of the questions raised in this article will aid in ensuring an increase in the efficiency of public production in the Kazakh SSR as well as in the country's national economy as a whole.

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Equalizing Economic Development Levels

Alma Ata NORODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 11, Nov 84 pp 24-29

[Article by N. Kuzenbayev, candidate of economic sciences: "Equalizing the Levels of Economic Development: Methodological and Procedural Bases for Evaluating the Levels of Economic Development of the Intrarepublic Regions"]

[Text] In our country, an equalizing of the levels of economic development of the republics has been carried out. The decree of the CPSU Central Committee "On the 60th Anniversary of the Great October Socialist Revolution" states that "in the years of Soviet authority, there has been an equalization of the level of economic development of all Soviet republics." Now the task objectively arises of equalizing the levels of economic development of intrarepublic regions. It has become essential to do more in each region to utilize natural wealth and conditions as well as manpower resources, seeking to advance the economic system and to increase the production of output, especially in rayons that are lagging behind in economic development.

It is known that the level of economic development of a region depends upon the totality of factors and conditions. The most important of them are: rational distribution of productive forces, extent of utilization of the production potential, assimilation of natural resources, natural conditions, manpower resources, and the overall development of the economy.

Along with the rapid growth of the republic's economy, one observes differences in the development levels of the oblasts. The question arises: Is it possible to eliminate them completely? In this regard, F. Engels wrote: "There will always be a certain inequality in the living conditions between individual countries, regions and even localities. It will be possible to reduce the inequality to a minimum but it will never be possible to eliminate it entirely."¹ The task is to bring their levels closer together, eliminating the important differences between them.

Before resolving this task, it is essential, in our view, to evaluate the levels of economic development of the regions. The well-known economist Sh. L. Rosenfeld writes: "The main task in evaluating the levels of development of the economy in the rayons involves providing planning with materials of a specifically rayon nature and indicating to what extent the peculiarities of today's conditions influence the development of productive forces and what is necessary to equalize the levels of economic development of the regions."²

What should be the territorial limits of this evaluation and what indicators should be used? It seems to us that one must proceed from the Leninist methodology of the grouping of rayons according to similar characteristics, which is the basis for the formation of a system of rayon national economic complexes--intrarepublic regions. We note that under the level of economic development of an intrarepublic region we understand a certain stage of the development of its productive forces achieved on the basis of contemporary scientific-technical progress and the efficient utilization of natural wealth, manpower resources and natural conditions to satisfy the material and cultural demands of its population under the continuous increase in its contribution to the unified national economic complex of the country.

Now about the indicators for the evaluation of the levels of their development. As is known, the levels of the economic development of the union republics are

determined in accordance with the per-capita national income of the population or the national income per able-bodied worker. This indicator, however, is not suitable for low-level territorial units, for which the volumes of national income are not calculated. Obviously, it is necessary to employ a system of indicators. In this connection, one should take indicators that can be subjected to quantitative measurement and analysis. Among them we include (per capita of population):

- production of industrial output,
- productive industrial fixed capital,
- number of workers in industry per 1,000 population,
- electric power production,
- production capital investments in industry,
- gross agricultural output,
- power capacities in agriculture.

These indicators (determining conditions) are interrelated. In the first place, industry and agriculture, as decisive sectors of physical production, are interconnected through reciprocal deliveries of output, supplying the entire reproductive process in the society. In the second place, productive, industrial fixed capital and the output of electric power and power capacity in agriculture are the main factors in the production of both industrial as well as agricultural output. Thirdly, the volume of productive industrial fixed capital, the production of electric power, the number of workers per 1,000 population, and capital investment in industry represent decisive indicators of the industrial development of regions and the basis for the utilization of the achievements of scientific-technical progress, for increasing the economic potential, and for improving the conditions of production, labor and the everyday life of the population. They also express the basic principle of K. Marx: "Economic epochs are distinguished not by what is produced but by how it is produced, through what means of labor." Consequently, in evaluating the levels of economic development of intrarepublic regions, it is not enough to have an idea of the overall volumes of output. It is also essential to be familiar with the technical basis of production.

In selecting these indicators, consideration was given above all to the connection of each element of the system with the output of the two main sectors of physical production--industry and agriculture. Consideration was then given to the necessity of simplifying the system, of reducing it to a smaller number of indicators, so that there was the possibility of determining their quantitative influence on one another and of controlling and analyzing the entire system of indicators. Some indicators, in particular the satisfaction of the physical and cultural demands of the population, the return on investment, and others, were not included among the elements of the proposed system as derived from the volume of production output and from the efficient use of fixed production capital.

Let us examine the correlations between the adopted indicators. To determine the closeness of the connection, coefficients of paired correlation have been calculated according to the following formula:

$$r_{Y_K X_m} = \frac{\sum_{i=1}^n (Y_{Ki} - \bar{Y}_K) (X_{mi} - \bar{X}_m)}{\sqrt{\sum_{i=1}^n (Y_{Ki} - \bar{Y}_K)^2 \sum_{i=1}^n (X_{mi} - \bar{X}_m)^2}}$$

where Y_K is the indicator of the production of industrial output if $K = 1$, and the indicator of agricultural output if $K = 2$;

X_m is the indicator of the determining conditions;

\bar{Y}_K, \bar{X}_m are the average values of the indicators;

m is 1, 2, 3 or 4 if $K = 1$;

m is 5 if $K = 2$;

i is 1, 2, 3...10, numbers of observations (territorial units).

We are examining the correlations for 10 regional national economic complexes. Indexes of the indicators of economic development (the relation of the individual indicators of the regions per capita relative to the republic average) serve as the basis for the calculations. They are shown in Table 1. In this table, coefficients of paired correlation are calculated between the indexes of industrial output per capita of population (Y_i) and other determining conditions:

--fixed production capital X_1 ;

--the number of workers in industry per 1,000 people in the population X_2 ;

--electric power production X_3 ;

--production capital investment X_4 .

In agriculture, the coefficient of correlation has been calculated between the indexes of gross production Y_2 and power capacities X_5 .

Calculations have shown that the coefficient of correlation between indexes of production of industrial and agricultural output per capita and other determining conditions are correspondingly:

$$\begin{aligned} r_1 &= 0.68 \\ r_2 &= 0.81 \\ r_3 &= 0.77 \\ r_4 &= 0.18 \\ r_5 &= 0.89 \end{aligned}$$

As we see, the interrelationship between capital investments in industry and output is weak ($r_4 = 0.18$). This is explained by the fact that capital investments have no direct connection with the production of output. The latter is mediated through the active part of industrial capital, in which its relative share does not exceed 30 percent. For the other positions, the correlations are rather high.

The data presented indicate the correctness of the choice of a system of indicators characterizing the overall extent of economic development of different regions of Kazakhstan. With such heterogeneity, however, it is difficult of evaluate the levels under review. They must be brought under one aggregate. As no system of methods has been worked out here, we will examine several methods approximately analogous to the methods of the grouping of grades and sections according to yield that were once used by the academician V.S. Nemchinov and which would make it possible to evaluate the levels of economic development of the regions by means of their grouping.

We have expressed the diverse economic indicators of the regions in the form of indexes (the relations of the individual indicators of the regions to their republic-average indicators). We designate the individual indicators of economic development through $y_1, y_2, x_1, x_2, \dots, x_n$. Consequently, the conditions for the inclusion of diverse indicators in one aggregate are: the conversion of magnitudes of different denominations into relative magnitudes; and the evaluation of the position of the regions for each individual indicator, that is, the inclusion in a group or the determination of the position occupied in the system of regions.

In this connection, one of the simplest methods of including diverse indicators of the economic development of regional national economic complexes -- intra-republic regions in one whole is the incidence of their indicators in one group or another. For this purpose, use is made of the indexes of the indicators for the regions. On their basis, it is possible to group the regions according to the level of economic development.

As we see from Table 1, according to the index of per-capita production of industrial output, Pavlodar, Karaganda-Dzhezkazgan, Vostochno-Kazakhstan and Semipalatinsk regional complexes are included in the highest group of economic development under the conditions of Kazakhstan (with an index above the republic's average indicator); the group with a medium level of development (with an index no lower than 0.75 of the republic's average indicator) included Kustanay-Turgay, Alma-Ata-Taldy-Kurgan, Severo-Kazakhstan and Yuzhno-Kazakhstan regional complexes; and the lowest group (with an index under 0.75 of the republic average) included Aktyubinsk-Ural and Gur'yev-Mangyshlak regional complexes. The composition of the groups varies depending upon the incidence of the indicators of regional complexes in one group or another.

The first group according to gross agricultural output includes Aktyubinsk-Ural, Kustanay-Turgay, Pavlodar, Severo-Kazakhstan and Semipalatinsk regional national economic complexes. The second group includes the Alma-Ata-Taldy-Kurgan, Vostochno-Kazakhstan and Yuzhno-Kazakhstan complexes, and the third group includes the Gur'yev-Mangyshlak and Karaganda-Dzhezkazgan complexes.

The structuring of the regions according to groups also varies depending upon the incidence of their indicators by levels of economic development. Whereas for the index of per-capita industrial output, four regional complexes belong to the first group, four to the second and two to the third, for the index of productive industrial fixed capital there are five regional complexes in the first group and five of them in the third group. Their composition also changes sharply

for the remaining determining conditions. On the basis of the data on the incidence of indicators in different groups of levels, it is possible to distribute regional complexes to the following groups:

Vostochno-Kazakhstan, Karaganda-Dzhezkazgan, Kustanay-Turgay and Pavlodar regional complexes belong to the first (highest) group of economic development. The second group includes Severo-Kazakhstan and Semipalatinsk complexes, and the third group includes the Aktyubinsk-Ural, Alma-Ata-Taldy-Kurgan, Gur'yev-Mangyshlak and Yuzhno-Kazakhstan complexes.

Table 1. Indexes of Indicators of the Economic Development of National Economic Complexes Per Capita

Районные народно-хозяйственные комплексы (1)	y_1	x_1	x_2	x_3	x_4	y_2	x_5
Казахской ССР (2)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Актыубинско-Уральский (3)	0.63	0.61	0.84	0.18	0.54	1.10	1.38
Алма-Атинско-Талды-Курганский (4)	0.84	0.49	0.91	0.32	0.40	0.77	0.55
Восточно-Казахстанский (5)	1.42	1.52	1.39	1.54	1.28	0.91	0.74
Гурьевско-Мангышлакский (6)	0.73	1.68	1.67	1.67	3.70	0.38	0.30
Карагандинско-Джезказганский (7)	1.55	2.22	1.67	1.82	1.66	0.50	0.53
Кустанайско-Тургайский (8)	0.97	1.12	1.02	0.10	0.87	1.83	2.29
Павлодарский (9)	1.93	1.98	1.33	6.28	2.23	1.09	1.21
Северо-Казахстанский (10)	0.78	0.63	0.95	0.45	0.49	1.70	1.85
Семипалатинский (11)	1.21	0.48	0.86	0.02	0.42	1.02	1.05
Южно-Казахстанский (12)	0.77	0.69	0.69	0.56	0.85	0.76	0.57

Key:

- | | |
|---|--------------------------|
| 1. Regional National Economic Complexes | 7. Karaganda-Dzhezkazgan |
| 2. Kazakh SSR | 8. Kustanay-Turgay |
| 3. Aktyubinsk-Ural | 9. Pavlodar |
| 4. Alma-Ata-Taldy-Kurgan | 10. Severo-Kazakhstan |
| 5. Vostochno-Kazakhstan | 11. Semipalatinsk |
| 6. Gur'yev-Mangyshlak | 12. Yuzhno-Kazakhstan |

Calculated using statistical data of the Kazakh SSR TsSU [Central Statistical Administration] by oblasts for 1980

Gross agricultural production for 1976-1980 computed using annual averages according to the statistical yearbook "Narodnoye khozyaystvo Kazakhstana v 1980 g." [National Economy of Kazakhstan in 1980], Alma-Ata, 1981, p 72.

Agricultural energy capacities of the Kazakh SSR in accordance with the statistical reference book "Energeticheskiye moshchnosti sel'skogo khozyaystva na 1 yanvarya 1981 goda" [Agricultural Power Capacities on 1 January 1981], Alma-Ata, 1981, p 8.

In grouping the regions in accordance with the incidence of indicators, it is possible that its results were to some degree influenced by the visual evaluation. In this connection, for greater objectivity, let us examine the evaluation method using averaged points. That is, we will determine the positions occupied by the regions in accordance with the individual indicators of economic development. The less developed they are economically, the more points they will accumulate and vice versa.

Whereas the Pavlodar regional complex occupies first place in the index of industrial output per capita, second place in productive industrial fixed capital and fourth place in a agricultural output, the Aktyubinsk-Ural complex occupies 10th, eighth and third places in these indicators, respectively, and the Alma-Ata-Taldy-Kurgan complex occupies sixth, ninth and seventh places, respectively. Their averaging was done by summing the number of points (S) and relating them to the number of indicators (n) for each region (Table 2).

In seven economic indicators, the Aktyubinsk-Ural regional complex received an average of 6.71 points among the regions for the level of economic development. Alma-Ata-Taldy-Kurgan received 7.57 points, Pavlodar 2.43, and Karaganda-Dzhezkazgan 3.86 points. Now they must be grouped according to the level of economic development. For this purpose, the averaged points attained are distributed by groups with an interval from 2.1 to 4, from 4.1 to 6, and from 6.1 to 8. Indisputably, these intervals were dictated by the relatively narrow ranges of variation of the averaged points. In distributing them according to the indicated intervals, three groups were obtained, which was essential to break the regions down into higher, medium and lower levels of economic development. For this purpose, the consideration is that the closer the points are to one, the higher is the level of economic development and conversely. In accordance with the indicated intervals, the Karaganda-Dzhezkazgan and Pavlodar regional complexes belong to the first group, the Vostochno-Kazakhstan, Kustanay-Turgay and Severo-Kazakhstan complexes to the second group, and the third group includes the Aktyubinsk-Ural, Alma-Ata-Taldy-Kurgan, Gur'yev-Mangyshlak, Semipalatinsk and Yuzhno-Kazakhstan regional complexes.

The results of the grouping of regional complexes according to the method of incidence of indicators in the groups of levels differs from grouping according to averaged points in that the first group takes in four regional complexes in the first case, whereas it includes two regional complexes in the second case. The second group includes two regional complexes in the first case and three regional complexes in the second case, and the third group includes four and five regional complexes, respectively.

The third method of evaluating levels of economic development involves determining the share of the points in their totality. For this purpose, the points were totaled for each regional complex ($\sum S$). The points were then summed vertically, that is, for all 10 regional complexes (P). The sums of the quantities S, coinciding with the sums of the quantities P, form the totality of points Q, that is $\sum P = \sum S = Q$. The relation of the sum of points for each region to their totality ($\frac{S}{Q} \times 100$) determines its share in the latter (Table 3). This is the aggregated-index method.

It is clear from the table that the magnitudes of the shares of the points in the totality ranges from 4.42 to 13.77. Considering this, they were broken down into equal intervals of from 4.1 to 7, from 7.1 to 10, and over 10.1. It is the nature of the addends that the higher the relative weight of a region in the totality of points, the lower is the level of its economic development and vice versa. Proceeding from this principle, the first group includes Karaganda-Dzhezkazgan and Pavlodar, the second group Vostochno-Kazakhstan, Kustanay-Turgay and Severo-Kazakhstan, and the third group includes

Table 2. Evaluation of the Levels of Economic Development of Regional National Economic Complexes According to Averaged Points for 1980

	Занимаемые места по показателям экономического развития (баллы — S)										(2) Сумма баллов (ΣS)	(3) Усредненные баллы $(\frac{S}{n})$	Интервалы разности от 2,1 до 4 (5) от 4,1 до 6 (6) от 6,1 до 8 (7)			(8) Группы
	У ₁	X ₁	X ₂	X ₃	X ₄	У ₂	X ₅	X ₆	X ₇	X ₈						
1. Актобинско-Уральский (9)	10	8	8	8	8	7	3	3	3	3	47	6,71			6,71	III
2. Алма-Атинско-Талды-Курганский (10)	6	9	6	7	10	7	8	8	8	8	53	7,57			7,57	III
3. Восточно-Казахстанский (11)	3	4	2	4	4	6	6	6	6	6	29	4,14		4,14		II
4. Гурьевско-Мангышлакский (12)	9	3	10	3	1	10	10	10	10	10	46	6,57			6,57	III
5. Карагандинско-Джезказганский (13)	2	1	1	2	3	9	9	9	9	9	27	3,86	3,86			I
6. Костанайско-Тургайский (14)	5	5	4	9	5	1	1	1	1	1	30	4,29		4,29		II
7. Павлодарский (15)	1	2	3	1	2	4	4	4	4	4	17	2,43	2,43			I
8. Северо-Казахстанский (16)	7	7	5	6	8	2	2	2	2	2	37	5,28		5,28		II
9. Семипалатинский (17)	4	10	7	10	9	5	5	5	5	5	50	7,14			7,14	III
10. Южно-Казахстанский (18)	8	6	9	5	6	8	8	8	8	8	49	7,0			7,0	III

Key:

1. Positions occupied in indicators of economic development (points-S)
2. Sum of points
3. Averaged points
4. Grouping intervals
5. From 2.1 to 4
6. From 4.1 to 6
7. From 6.1 to 8
8. Groups
9. Aktyubinsk-Ural
10. Alma-Ata-Taldy-Kurgan
11. Vostochno-Kazakhstan
12. Gur'yev-Mangyshlak
13. Karaganda-Dzhezkazgan
14. Kustanay-Turgay
15. Pavlodar
16. Severo-Kazakhstan
17. Semipalatinsk
18. Yuzhno-Kazakhstan

Table 3. Evaluation of the Levels of Economic Development of Regional National Economic Complexes According to Shares of Points in Their Totality

	Занимаемые места по экономическим показателям (баллы — S) (1)									ΣS	Доля в совокупности $\frac{\Sigma S}{Q} (2)$	Интервалы для группировки			Группы (7)
	y ₁	x ₁		x ₂		x ₃		x ₄				x ₅	от 4,1 (4) до 7,1 (5)	от 7,1 (5) до 10,1 (6)	
		x ₁	x ₂	x ₃	x ₄	x ₅	x ₆	x ₇							
Актюбинско-Уральский (8)	10	8	8	8	8	7	3	3	3	47	12,21			12,21	III
Алма-Атинско-Талды-Курганский (9)	5	9	6	7	10	7	8			53	13,77			13,77	III
Восточно-Казахстанский (10)	3	4	2	4	4	4	6	6		29	7,53		7,53		II
Гурьевско-Мангышлакский (11)	9	3	10	3	1	10	10			46	11,94			11,94	III
Карагандинско-Джезказганский (12)	2	1	1	2	3	9	9			27	7,01	7,01			I
Кустанайско-Тургайский (13)	5	5	4	9	5	1	1			30	7,79		7,79		II
Павлодарский (14)	1	2	3	1	2	4	4			17	4,42	4,42			I
Северо-Казахстанский (15)	7	7	5	6	8	2	2			37	9,61		9,61		II
Семипалатинский (16)	4	10	7	10	9	5	5			50	12,99			12,99	III
Южно-Казахстанский (17)	8	6	9	5	6	8	7			49	12,73			12,73	III
Сумма Р (18)	55	55	55	55	55	55	55	55	55	385 (Q)					

Key:

- Positions occupied in economic indicators (points-S)
- Share in the totality
- Grouping intervals
- From 4.1 to 7
- From 7.1 to 10
- Over 10.1
- Groups
- Aktyubinsk-Ural
- Alma-Ata-Taldy-Kurgan
- Vostochno-Kazakhstan
- Gur yev-Mangyshlak
- Karaganda-Dzhezkazgan
- Kustanay-Turgay
- Pavlodar
- Severo-Kazakhstan
- Semipalatinsk
- Yuzhno-Kazakhstan
- Sum

Aktyubinsk-Ural , Alma-Ata-Taldy-Kurgan, Gur'yev-Mangyshlak, Semipalatinsk, and Yuzhno-Kazakhstan.

The results of the evaluation of the levels of economic development of the regional complexes coincide for the method of averaged points and for the computation of the share of the points in their totality. Therefore, these methods are suitable for including diverse indicators in one totality. Thus, the use of the system of indicators represents a real approach to evaluating the levels of economic development of intrarepublic regions.

The cited grouping of regional complexes, as a form of manifesting the evaluation of the levels of their economic development, reflects the actual situation that has developed in the current stage. It doubtless will change as the economic structures are improved.

Mention was made above of the close correlations between the production of industrial output and other indicators of the economic development of regions as well as between agricultural output and power capacities in agriculture. The data of Table 1 also give evidence of the relationships between indexes for production output and other determining conditions. Let us take the Aktyubinsk-Ural regional complex. Here, with an index of productive industrial fixed capital amounts to 0.61, the index of agricultural output is 1.10, and the index of power capacities in agriculture is 1.38. In the Severo-Kazakhstan regional complex, the index of per-capita production of industrial output of 0.78 corresponds to the index of productive industrial fixed capital of 0.63, and the index of gross agricultural output of 1.70 corresponds to the index of power capacities of 1.85. Consequently, the indicators shown are interrelated and reflect the general trend in each region and certain natural paths.

The proposed system of indicators of the methodological and procedural bases for evaluating the level of economic development of intrarepublic regions, in characterizing different aspects of the economic life of the regions, represents a more realistic yardstick. On this basis, diverse indicators are included in one totality through grouping them. Three groups of regional complexes have been distinguished for the levels of economic development. Two complexes have been included in the highest group under the conditions of Kazakhstan, three in the middle group and five in the lowest group. Such a grouping is the basis for examining the task of eliminating the essential differences between them in the process of planning the economic and social development of the republic.

FOOTNOTES

1. K. Marx and F. Engels, "Sochineniya" [Works], Vol 34, p 104.
2. Sh. L. Rosenfeld, "Metodologiya vyravnivaniya urovney razvitiya ekonomicheskikh regionov SSSR" [Methodology of Equalizing Levels of Development of Economic Regions of the USSR], Moscow, 1969, p 5.
3. Marx and Engels, op. cit., Vol 23, p 191.

4. V.S. Nemchinov, "Izbrannyye proizvedeniya" [Selected Works], Vol 2, Moscow, "Nauka," 1967.

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REGIONAL DEVELOPMENT

ESTONIAN PRODUCTION EFFICIENCY INDICATORS DETAILED

Moscow VESTNIK STATISTIKI in Russian No 12, Dec 84 pp 21-28

[Article by V. Vokk, deputy chief of the Estonian SSR Central Statistical Administration, candidate of economic sciences, and S. Ippolitov, acting laboratory chief of the Scientific Research Institute of the USSR Central Statistical Administration, candidate of economic sciences: "Deepening Analysis of the Economic Effectiveness of Public Production in the Republic"]

[Text] In order to evaluate and analyze the economic effectiveness of the republic's public production, the Estonian SSR Central Statistical Administration utilizes a number of indicators. They include indicators of labor productivity, material-intensiveness of the output, output-capital ratio, turnover of material circulating capital, expenditures per ruble of output, profitability of the output and production capital, the effectiveness of capital investments and several others.

At the national economic level the economic effectiveness of public production is studied in terms of indicators of the productivity of public labor, the material-intensiveness of the product, and the output-capital ratio.

During 1971-1982 the main indicators of the economic effectiveness of public production changed in the following way.

Table 1--Basic Indicators of Economic Effectiveness of Public Production of Estonian SSR* (in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Growth rates:				
of productivity of public labor	129.1	153.4	156.0	164.2
of material-intensiveness of products (not including amortization)	98.4	97.3	96.2	93.0
of output-capital ratio	89.0	82.4	79.4	79.8

- * The indicators were calculated in the following way: the productivity of public labor--the ratio between the national income in comparable prices and the average annual number of workers in the sphere of production; material-intensiveness of products--the ratio between material expenditures in comparable prices and the gross social product in comparable prices; output-

capital ratio--the ratio between the national income in comparable prices and the average annual value of fixed production capital.

From the figures in the table it is clear that the indicators of the productivity of public labor and the material-intensiveness of the products had a positive dynamic while the indicator of the output-capital ratio had a negative one. Of course, the indicator of the output-capital ratio can also have a positive tendency. In particular, in 1982 the utilization of the fixed production capital of the republic improved somewhat as compared to 1981.

From the main indicators of the economic effectiveness of public production one cannot judge: whether the economy of the republic developed effectively or ineffectively even with a positive dynamic of all indicators. The primary reason is that they are not a system: they do not include a main (integral) indicator and particular ones. Moreover, they are not intercoordinated in terms of economic content or dimensions. This has also predetermined the need to search for new approaches to the evaluation of the economic effectiveness of public production.

A quantitative evaluation of any phenomenon, including such a complicated one as the economic effectiveness of public production, can, in our opinion, be produced only if there is in the system of the main (integral) indicator also a hierarchy of particular indicators which are developed from the main indicator and characterize its structure. All indicators--main and particular--must be intercoordinated in terms of the economic content and dimensions.

In 1983 the Estonian SSR Central Statistical Administration, in order to produce a quantitative evaluation of the economic effectiveness of public production, tested a system of indicators which was constructed on the basis of the following methodological principles.

It is known that as a result of the interaction of the labor force and the means of production one obtains a product in which is embodied newly combined (live) labor and that which is transferred from the consumed means of production (embodied). The less socially necessary labor that is expended on the production of products, the lower its cost. Hence it follows: the economic effectiveness of public production is characterized by the amount of labor expenditures that are socially necessary for the production of a unit of output, that is, the cost. Consequently, the main (integral) indicator of the economic effectiveness of public production characterizes the quantity of products per unit of expenditure of socially necessary labor (per unit of cost) or the amount of expenditures of socially necessary labor (cost) per unit of output. Particular indicators of the economic effectiveness of public production characterize the quantity of products per unit of expenditure of live labor (newly created value) or embodied labor (transferred value) and also the amount of expenditures of live labor (newly created value) or embodied labor (transferred value) per unit of output.

On the basis of what has been presented above, the system of indicators of the economic effectiveness of public production can be presented in the following form: the effectiveness of expenditures of all (live and embodied) labor; the

effectiveness of labor expenditures that form the production cost (necessary plus past, embodied labor) of products; the effectiveness of expenditures of necessary labor; the effectiveness of expenditures of added labor; the effectiveness of expenditures of embodied labor; the effectiveness of expenditures of labor embodied in consumed implements of labor (raw material, basic and auxiliary materials, fuel and so forth); the effectiveness of expenditures of labor embodied in consumed means of labor (fixed production capital).

In the system that is presented the indicator of the effectiveness of expenditures of all (live and embodied) labor is the main (integral) indicator, and all the others are particular indicators of the effectiveness of public production.

In order to calculate the indicators of the economic effectiveness of public production in practice it is possible to utilize indicators of the expenditures of total labor on the production of products or prices, which are forms of manifestation of socially necessary expenditures of labor (value).

Let us consider first the methodology for calculating the main and particular indicators of the economic effectiveness of public production per physical (labor) unit of expenditures.

It is known that the indicators of the expenditures of total labor on the production of a unit of output (indicators of complete labor-intensiveness) can be calculated from data of interbranch balances of the production and distribution of the social product. But it is also possible to use another, simpler method of calculating the indicators of expenditures of total labor per unit of output.

In the process of labor, as we know, one creates a product in which is accumulated human labor which forms its value, and which is composed of the following elements: c (embodied labor), v (necessary labor), and m (added labor). As K. Marx noted, each of these elements can be expressed in proportions of the product.¹

Let us designate the entire volume of produced output by the symbol Q , the volumes of output reflecting the elements of value c , v , m --by the symbols q_c , q_v , q_m , and the value of the entire volume of output--by the symbol P . Then

$$\frac{P}{Q} = \frac{c + v + m}{q_c + q_v + q_m}$$

Since the volume of each part of the product is proportional to the corresponding part of the value, $q_c = Q/P \times c$, $q_v = Q/P \times v$, $q_m = Q/P \times m$, or

$$\frac{P}{Q} = \frac{c}{q_c} = \frac{v}{q_v} = \frac{m}{q_m}$$

Having substituted the amount P, c, v, and m with the indicators tau, t_c , t_v , t_m , which characterize expenditures of total, embodied, necessary and added labor, the equation written above assumes the form:

$$\frac{\tau}{Q} = \frac{t_c}{q_c} = \frac{t_v}{q_v} = \frac{t_m}{q_m}$$

Hence it follows: the labor which created one or another element of the value characterizes the expenditures of the total (live and embodied) labor of the production of products, which reflects the given element of the value. Consequently, if one knows the labor expenditures which created any particular element of the value and the amount of the value created by it, and also the volume of products produced and the amount of their value, the expenditures of total labor or the production of a unit of output can be calculated by using the following formulas:

$$\tau = (t_i \cdot P/p_i) : Q, \quad (1)$$

$$\tau = (t_i \cdot Q/q_i) : Q, \quad (2)$$

$$\tau = t_i/q_i \quad (3)$$

where τ -- expenditures of total labor per unit of output;

t_i -- expenditures of labor which created i element of value;

P -- amount of value of entire product;

p_i -- amount of i element of value;

Q -- value of product;

q_i -- volume of product reflecting i element of value.

When Q is divided by $(t_i \cdot P/p_i)$ and by $(t_i \cdot Q/q_i)$, and q_i --by t_i , we obtain indicators of the effectiveness of expenditures of the total labor (W). If instead of q_i we substitute $(q_v + q_m)$, and instead of t_i -- $(t_v + t_m)$, then $(q_v + q_m):(t_v + t_m)$ characterizes the productivity of public labor. It is calculated by the ratio of the national income (ND) in comparable prices and the average annual number of workers (T) in the sphere of material production, which approximately characterizes labor expenditures which created the new value. Consequently, the indicator of the productivity of public labor is the main, integral indicator of the economic effectiveness of public production.

For analytical purposes it is important to know not only the effectiveness of expenditures of total labor, but also the effectiveness of expenditures of live and embodied labor. Therefore, in addition to the main indicator, in the system we have also singled out particular indicators which can be calculated by using the following method.

The effectiveness of labor expenditures that form the production cost of the products is calculated according to the formula:

$$W_c = ND:(T \frac{MZ + MD_1}{VP}),$$

where W_c -- the effectiveness of labor expenditures that form the production cost of the product;
 ND -- the volume of national income in comparable prices;
 T -- expenditures of total labor on the production of the national income in comparable prices (they are equal to expenditures of live labor for the entire volume of output);
 MZ -- material expenditures (including amortization) in comparable prices;
 ND_1 -- the amount of national income in comparable prices utilized for private consumption is determined as the product of the national income in comparable prices and the proportion of wages of workers in the sphere of material production (fund of calculated wages; bonuses not included in the wage fund; business expenses; payments for organized recruitment of labor force; wages on kolkhozes in monetary and physical form; incomes from private subsidiary farms) in the national income in current prices;
 VP -- the volume of the gross social product in comparable prices.

The effectiveness of expenditures of live labor (W_{zh}) is determined according to the formula:

$$W_{zh} = ND:(T ND/VP). \quad (5)^2$$

The effectiveness of expenditures of necessary labor (W_n):

$$W_n = ND:(T ND_1/VP), \quad (6)$$

where ND_1 --national income in comparable prices for consumption.

The effectiveness of expenditures of added labor (W_p):

$$W_p = ND:(T ND_2/VP), \quad (7)$$

where ND_2 --national income in comparable prices for accumulation and other expenditures ($ND_2 = ND - ND_1$).

The effectiveness of expenditures of embodied labor (W_o):

$$W_o = ND:(T MZ/VP). \quad (8)$$

The effectiveness of expenditures of labor embodied in consumed objects of labor (W_{op}):

$$W_{op} = ND:(T MZ_1/VP), \quad (9)$$

where MZ_1 --material expenditures (not including amortization in comparable prices).

The effectiveness of labor expenditures embodied in consumed means of labor (W_{oc}):

$$W_{oc} = ND:(T MZ_2/VP), \quad (10)$$

where MZ_2 --amortization deductions in comparable prices.

The indicators of the economic effectiveness of public production were calculated by the method presented above (see Table 2).

Table 2--Growth Rates of Economic Effectiveness of Public Production of Estonian SSR* (in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Growth rates:				
Effectiveness of total (live and embodied) labor expenditures	129.1	153.4	156.0	164.2
Effectiveness of labor expenditures that form production cost	129.9	153.6	156.5	165.7
Effectiveness of expenditures of live labor	131.5	156.0	158.0	161.3
Effectiveness of expenditures of necessary labor	136.9	159.5	162.5	163.9
Effectiveness of expenditures of added labor	125.8	152.0	153.4	158.4
Effectiveness of expenditures of public labor	127.5	151.7	154.5	167.9
Effectiveness of expenditures of labor embodied in consumed objects of labor	131.2	157.7	162.0	177.7
Effectiveness of expenditures of labor embodied in consumed implements of labor	99.3	108.9	105.0	107.3

* Here and henceforth indicators are calculated on the basis of existing reports.

From the figures in Table 2 it is clear that in the period of time that was analyzed the growth of economic effectiveness of public production was provided in the republic as a result of reducing expenditures of live and embodied labor, including expenditures of labor embodied in consumed means of labor. It is typical that the effectiveness of expenditures of labor embodied in consumed means of labor increased in the republic while there was a reduction of the output-capital ratio by more than 20 points. The contradictoriness of the indicators is conditioned by a number of circumstances. One of them is the lack of correspondence between the prices and the value of fixed production capital. Additionally, it is incorrect, in our opinion, to determine the effectiveness of the utilization of fixed production capital only from the indicator of the output-capital ratio, which

reflects the change in the amount of funds used for producing a unit of output in physical-substantial form and does not take into account changes in labor expenditures on reproducing them. Still, in the analysis of the utilization of fixed production capital it is important to take into account the change in labor expenditures which is carried over to the product from the means of labor both as a result of the change in labor expenditures on their reproduction and as a result of the change in the amount of applied fixed production capital in the production of a unit of output. This is necessary because their physical wear and tear is not equal to their deterioration in value. Therefore the large amount of applied fixed production capital in the production of a unit of output can be covered by the reduction of expenditures of total labor on their reproduction in branches that produce fixed capital. Similarly, it is necessary to analyze the indicators of the material-intensiveness of the product.

Economizing on labor expenditures for all elements of production provided for a corresponding increase in the effectiveness of expenditures of total labor, which is clear from the figures in Table 3.

Table 3--Proportion of Growth of Economic Effectiveness of Public Production of Estonian SSR Resulting From Reduction of Expenditures of Live and Embodied Labor (in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1982</u>
Growth of effectiveness of total labor expenditures	100	100	100
Including:			
From reduction of expenditures of live labor	43.0	41.6	8.9
From reduction of expenditures of embodied labor	57.0	58.4	61.1
Including:			
From reduction of expenditures of labor embodied in consumed objects of labor:	57.0	57.1	60.2
a) from reduction of total labor on reproduction of objects of labor	51.8	52.2	50.5
b) from change in material-intensiveness of products	5.2	4.9	9.7
From reduction of expenditures of labor embodied in consumed means of labor:	--	1.3	0.9
a) from reduction of total labor on reproduction of means of labor	--	1.3	0.9
b) from change in output-capital ratio*	--	--	--

* Since the republic's output-capital ratio decreased, all the increase in the effectiveness of expenditures of total labor was gained by reducing expenditures of total labor on the reproduction of fixed production capital.

It is typical that the economic effectiveness of public production increased in the republic to a greater degree as a result of reducing expenditures of

embodied labor, and primarily as a result of labor which is embodied in consumed objects of labor.

The increased economic effectiveness of public production, to an ever greater degree as a result of the reduction of expenditures of an embodied labor and especially as a result of a reduction of expenditures of labor embodied in consumed objects of labor, is conditioned by further deepening of public division of labor. The increased effectiveness of expenditures of embodied labor has also been influenced by the fact that material-intensiveness of products in the republic dropped by 7 points during the period that was analyzed, which provided for a 9.5-point reduction of labor expenditures embodied in consumed means of production, and a 9.7-point reduction of expenditures of labor embodied in consumed objects of labor.

The increased economic effectiveness of public production in the republic as a result of reduced expenditures of embodied labor could be more significant if they were reduced in agriculture, where there has been a considerable increase in the expenditures of embodied labor on the production of each unit of each output.

An increase in the economic effectiveness of public production was observed in the Estonian SSR for individual periods, but the rates had decreased (see Table 4).

The main reasons for the slowing up of the growth rates of the economic effectiveness of production are: the aging of fixed production capital; the existence of a considerable proportion of workers who perform manual work (this is brought about to a certain degree by the fact that with a continuous increase in fixed production capital that is put into operation on an average per one worker, comprehensiveness is still not provided in the mechanization of production processes); the underutilization of existing production capacities, including as a result of losses of working time because of down time, unexcused absences and absences with the permission of the administration.

Table 4--Growth Rates of Economic Effectiveness of Public Production of Estonian SSR (in percentages of preceding period)

<u>Indicators of Rates of Growth of Effectiveness of Expenditures</u>	<u>1970-1975</u>	<u>1975-1980</u>	<u>1980-1981</u>	<u>1981-1982</u>
Total labor	129.1	118.8	101.1	105.9
Live labor	131.5	118.7	101.3	102.1
Embodied labor	127.5	118.9	101.9	108.6
Labor embodied in consumed objects of labor	131.2	120.3	102.7	109.7
Labor embodied in consumed means of labor	99.3	109.6	96.4	102.2

It should be emphasized that the analysis of the economic effectiveness of public production in the republic that was conducted according to the system of indicators we suggested confirms the point of K. Marx to the effect that: "Increased labor productivity consists precisely in that the share of live

labor decreases and the proportion of past labor increases, but it increases in such a way that the overall sum of labor included in the commodity decreases.³

During the period of time that was analyzed the proportion of live labor for the production of a unit of output in the national economy of the Estonian SSR decreased from 42.9 percent to 38.2 percent, and the proportion of embodied labor increased from 57.1 percent to 61.8 percent. Moreover expenditures of live and embodied labor on the production of a unit of output decreased by 39.5 percent. As a result of this the economic effectiveness of public production in the Estonian SSR during 12 years (1971-1982) increased by 64.2 points.

Indicators of the economic effectiveness of public production utilizing expenditures in monetary measurement were calculated according to the following methodology:

the effectiveness of expenditures of total labor⁴--as the ratio between the gross social product (gross output) in comparable prices and its value, that is, the gross social product in current prices;

the effectiveness of expenditures of live labor--as the ratio between the gross social product in comparable prices and the amount of newly created value, that is, the national income in current prices;

the effectiveness of expenditures of embodied labor--as the ratio between the gross social product in comparable prices and the value of consumed material resources, that is, their expenditures in current prices;

the effectiveness of expenditures of labor embodied in consumed objects of labor--as the ratio between the gross social product in comparable prices and the value of consumed material resources (not including the value of consumed fixed capital), that is, their expenditures in current prices;

the effectiveness of expenditures of labor embodied in consumed means of labor--as the ratio between the gross social product in comparable prices and the value of consumed fixed production capital, that is, their expenditures in current prices.

The following results were obtained using the methods presented above (see Table 5).

It is not difficult to note that these figures describe quite a different picture from the one described by the figures in Table 2. With the expenditure of a certain growth in the effectiveness of expenditures of live labor, there is a continuous reduction of expenditures of embodied labor. Moreover, the increased effectiveness of live labor did not cover the reduction of the effectiveness of expenditures of embodied labor. As a result, the effectiveness of the expenditures of total labor did not increase, and during the past 2 years they even decreased as compared to 1970.

Table 5--Growth Rates of Effectiveness of Labor Expenditures, Reflected
in Monetary Units of Measurement, in Estonian SSR National Economy
(in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Growth rates of effectiveness of expenditures:				
of total (live and embodied) labor	101.0	100	99.0	95.9
of live labor	110.5	110.1	107.9	108.3
of embodied labor	95.3	93.6	94.2	88.9
of labor embodied in consumed objects				
of labor	97.9	96.8	97.9	92.6
of labor embodied in consumed means				
of labor	77.0	71.0	67.4	65.1

The difference between the tendencies of the indicators of economic effectiveness of public production calculated per monetary unit of labor expenditures and the analogous indicators calculated per physical unit of labor expenditures is brought about by the fact that the change in prices for the means of production does not reflect changes in expenditures of total labor on their reproduction.

Thus while the average price per unit of consumed objects of labor in industry of the Estonian SSR increased as compared to the average price per unit of consumed objects of labor in 1970 by 0.18 points, the total expenditures of labor on their reproduction during this period of time decreased by 41.4 points. Therefore when utilizing in calculations of the economic effectiveness of public production the physical and monetary measurements of labor expenditures there are positive tendencies. For this same reason there is a contradictory evaluation of the effectiveness of expenditures that are transferred to the product from the fixed production capital.

Of the methods of evaluating the economic effectiveness of public production considered above the most realistic results can be obtained, in our view, by the method that is based on comparing production volumes and physical indicators of labor expenditures. The other methods considered in the article do not make it possible to draw correct conclusions: whether the economy of a given region has developed effectively or ineffectively during the period that is being investigated.

FOOTNOTES

1. Marx, K., and Engels, F. "Soch." [Works], vol 23, p 232.
2. Formula (b) can be transformed into the formula $W_{zh} = VP:T$, where T characterizes expenditures of live labor on the production of the entire volume of output.
3. Marx, K., and Engels, F., "Soch.", vol 25, part I, p 286.

4. The calculation of the effectiveness of expenditures of total labor according to this ratio is also correct if it is understood as the ratio between base and current prices since the effectiveness of production of products is characterized by a reduction of its value which is manifested in the form of the price.

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REGIONAL DEVELOPMENT

UKRAINIAN SSR MATERIAL-TECHNICAL BASE SURVEYED

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 10, Oct 84 pp 65-71

[Article by A. Yemel'yanov, corresponding member of the UkSSR Academy of Sciences: "The Strengthening of the Material-Technical Base--the Main Economic Task of the Party and the People"]

[Text] The material-physical elements represent the totality of the material-substantive elements of the productive forces and the organizational-technical conditions which form the basis of material production. It characterizes the level of development of the productive forces of a society, its possibilities, and its economic and productive potential.

Among the physical elements of the productive forces, a decisive role belongs to the means of labor, which in the process of production are conducive to the increase of its productivity and to the supply of the necessary output of material and spiritual goods. The improvement and further development of the means of labor requires the expansion of the range of the objects of labor being used, the application of new technologies, materials, and types of energy; it is connected with the necessity of improving the organization of production. Although labor resources are not included in the composition of the material-technical base, their professional and cultural-technical level nevertheless constitutes an indispensable condition for the effective utilization of the material-technical base of a society.

Every mode of production is characterized by its own material-technical base, which provides the material conditions corresponding to its socio-economic nature. The material-technical base of socialism is formed on the basis of the collectivization of production and labor, the carrying out of socialist industrialization, the collectivization of agriculture, and the strengthening of the defense capacity of the country. Characteristic features of the material-technical base of the developed socialist society are colossal volumes of national wealth, highly developed industry, enormous and highly-developed agriculture, a powerful infrastructure network, and a high scientific-technical level of personnel. With every five-year-plan, dozens of new large industrial centers and junctions, transportation arteries, and territorial complexes are making their appearance. There is rapid growth in the productive and scientific-technical potential of the all sectors of the national economy, an increase in the level of the well-being and culture of the people, and an increase in the strength of the defense capacity of the country.

The national wealth accumulated during the years of the five-year-plans amounted to 2.7 trillion rubles (without the value of mineral wealth, land and timber resources) at the beginning of the 1980's. Fixed assets constitute its most important part. In the middle of the 11th Five-Year-Plan, their sum came to approximately 2.1 trillion rubles, of which more than 1.4 trillion rubles fall to the share of basic producer goods--the material basis of the powerful production potential of the country. During the years of the 9th, 10th, and the first 3 years of the 11th five-year-plans, more than 800 billion rubles worth of them were created. The portion of these assets now considerably exceeds half of the assets operating altogether in the national economy. At the beginning of 1984, the number of workers and white collar workers employed in the national economy of the country, as well as kolkhoz farmers, came to about 130 million persons. From year to year there is an increase in the number and the ratio of specialists with higher and secondary specialized education.

The material-technical base of the USSR, therefore, possesses today colossal production potential. The national income of the country--this most important resulting indicator, which determines the possibilities of socialist expanded reproduction and current consumption--came to 530 billion rubles in 1983. The industry of the country is capable of producing annually more than 2 billion tons of conventional fuel, more than 1.4 billion kilowatt hours of electricity, 150 million tons of steel, about 19 million tons of steel pipes, and approximately 30 million tons of mineral fertilizers (in 100 percent nutrients equivalent) 4.4 million tons of synthetic resins and plastics, 1.4 million tons of chemical fibers and 2.2 billion rubles worth of metal-cutting machine tools, including 600 million rubles worth of tools with numerical program control. During 1983 there was an almost twofold increase in the output of automatic manipulators with program control--approximately 11,000 industrial robots were produced.

The production complex for consumer goods in 1983 gave the country 1.3 million automobiles, 4.2 million washing machines, 5.7 million refrigerators, 18 million radio receivers and televisions, more than 7 billion rubles worth of furniture, 11.4 billion square meters of fabrics of all types, 1.6 billion units of knitted underwear and outer wear, 745 million pairs of leather shoes, 3.2 million tons of sausage products, 1.5 million tons of butter, about 28 million tons of whole-milk products in terms of milk, 12.4 million tons of granulated sugar, more than 17 billion conventional units of canned goods, etc.

The efficiency of the agricultural sector of the economy is growing. In spite of difficult weather conditions, the production output in 1983 increased by 6.4 billion rubles and attained a volume of 134 billion rubles. There was an increase in the gross harvest of grain, sugar beet, long-fiber flax, potatoes, meat, milk, eggs and wool. Thanks to the energetic measures taken in carrying out the decisions of the May (1982) Plenum of the CPSU Central Committee within the framework of the Food Program of the USSR, the economy of the kolkhozes and sovkhoses has been strengthened. Their profit came to almost 17 billion rubles in 1983. There has been a decrease in the number of unprofitable farms.

Within the composition of the material-technical base of the USSR, the material-technical base of the Ukraine is developing successfully. At the beginning of 1984, the total value of the fixed assets of the republic came to 337 billion rubles, which exceeds almost threefold their magnitude at the end of 1965 and by 10 billion rubles--the tasks of the five-year-plan. Moreover, two-thirds of all fixed assets of the republic (220 billion rubles) are now made up of basic producer goods--the material basis of the modern economy of the Ukraine. Half of them fall to the share of the producer goods of industry. Today the industrial base of the Ukraine represents the combination of a powerful fuel-energy and metallurgical complex with highly-developed modern machine building and chemistry, as well as a multi-sector complex for the production of a broad assortment of food and non-food consumer goods.

Within the framework of the constantly improving public territorial division of labor, purposeful structural advances are being systematically realized, which are connected, first of all, with the more intensive utilization of the powerful production apparatus that has been created in the capital-intensive sectors of heavy industry and the accelerated increase of the potential in sectors playing a decisive role in the materialization of the achievements of scientific-technical progress. This positive process is also developing in the current five-year-plan.

In spite of the outstripping development of the fuel-energy base in the eastern regions of the country, where more favorable conditions exist for this, the Ukraine continues to play the important role of the large supplier of solid fuel, in particular coking coal for the needs of ferrous metallurgy not only of the European part of the USSR, but also a number of CEMA member countries. In 1983 the Ukraine provided the power system of the country and the Mir [Peace] Energy Ring with 243 billion kilowatt hours of electric power, or more than 17 percent of its all-union production. In the current five-year-plan and in the future, nuclear energy will make a decisive contribution to the growth of the production of electric power in the UkSSR, since the resources of the traditional energy sources are virtually exhausted.

The unique combination, on the territory of the Ukraine within the confines of a compact region, of the high-quality Donetsk coals, the Krivorozhskiy, the Kremenchugskiy and Kerchenskiy iron and the Nikopol'skiy manganic ores, as well as various other raw material components (fluxing limestones, dolomites, silica brick quartzites, fireclays, and others) make it possible to successfully develop and improve the ferrous metallurgy base of the republic. The share of the Ukraine in the all-union production of iron ore exceeds one-half, and in the smelting of steel and the output of rolled stock and steel pipes--one-third.

The trademark of UkSSR plants is found on powerful rolling mills, walking and rotary excavators, forge and press equipment and turbine generators. The republic provides 95 percent of the union production of trunkline diesel locomotives, approximately one-fourth of the alternating current motors, excavators, tractors and agricultural machines, chemical equipment, more than one-half of the trunkline freightcars, one-fourth of the output of the instruments, means of automation, computer technology and the spare parts for it, about one-third of the televisions, and more than 12 percent of the automobiles.

Within the all-union division of labor, the Ukraine acts as a large producer of mineral fertilizers (more than 16 percent in 1983), soda ash, sulphuric acid, titanium white pigment and carbon black, bromine, tires and industrial rubber products. During the past five-year-plans there has been a noticeable increase in the contribution of the republic to the all-union production of chemical fibers, synthetic resins and plastics, and dyes. The chemical-pharmaceutical industry is of all-union significance.

The production of light and food industry in combination constitutes almost one-third of the total volume of industrial production of the UkSSR. At the present time, the material-technical base of the republic makes it possible to manufacture almost one-fourth of the leather footwear and about one-fifth of the knitted underwear, and outer wear and garments being produced in the country. During the years of the 8th, 9th and 10th five-year-plans, the output of the food industry of the Ukraine increased by three-fourth. The republic is one of the largest producers of sugar not only in the country, but in the world as well: In 1983 approximately 7 million tons of it were produced, or about 56 percent of the all-union volume. The average annual production of meat, milk and butter constitutes 20-25 percent, and of vegetable oil--more than one-third of the all-union production.

The material-technical base of the agro-industrial complex is being strengthened rapidly. The consistent putting into practice of the agricultural policy of the CPSU and the realization of the Food Program--these are the powerful impulses which are conducive to the increasingly stable development of the agricultural sector of the economy. In the past few five-year-plans, the share of the republic in the average annual production of the gross output of the agriculture of the country came to approximately 23 percent, including almost 25 percent with respect to the production of plant-growing, and about 22.5 percent in animal husbandry. The share of the UkSSR in the all-union production of the most important forms of agricultural production has become settled within the same limits.

A component part of the material-technical base of the UkSSR is its developed transportation system. The density of the railway network being operated in the republic exceeds the average-union indicator by a factor of almost 6, and of the network of highways with hard surface--by a factor of 6.4. Appreciable is also the share of the Ukraine in the total volume of freight transports by railway (more than one-fourth) and motor vehicle (about one-fifth) types of transportation

In the contemporary stage, the most important directions of the further strengthening of the material-technical base are the following:

--The acceleration of the introduction of the achievements of the scientific-technical revolution by virtue of the systematic development of all elements of the material-technical base, the conduct of a single state policy of scientific-technical progress, the subordination of the main directions of scientific-technical progress to the interests of the entire society, the creation of interest of the workers in the application of new technology, and the

and the development of cost accounting relations between science and production;

--the creation of the material-technical conditions for the transfer of the economy to the intensive path of development;

--comprehensive mechanization, automation and robotization of the production processes;

--every conceivable development of new, economically efficient production sectors, new types of energy and materials;

--the increase of the technical level of production, in particular the creation and assimilation of advanced machines, mechanisms, equipment, the technology being employed, the increase of the rates of the technical reequipment of all sectors of the national economy, and the growth in the share of production of the highest category of quality;

--every conceivable economy and the rational utilization of material-technical, natural and labor resources;

--the utilization of a program-specific approach in the improvement of the material-technical base;

--the increase of the general education and cultural-technical level of the workers;

--the improvement of planning and the strengthening of the role of economic levers and stimuli in the development of the material-technical base.

An important feature of the modern material-technical base is the fundamental change of the role and place, in it, of science and scientific research activity. The scientific revolution is merging with the technical revolution in the presence of the outstripping development and leading role of science. Side by side with the objectification of science in the instruments and objects of labor, calling forth the merging of two autonomous streams into a single stream of scientific-technical progress, the materialization of science also occurs in the organization of production and in its management. New organizational forms of the relationship between material-productive and scientific-theoretical activity are coming into being in the form of production and scientific production associations, and scientific-technical complexes. Science is exerting an important influence on the level of the replacement of human labor by machine labor in the execution of production functions, freeing it not only from the expenditures of labor, but also the functions connected, to a significant degree, with mental activity, the control of technology, the control over the course of technological processes, and the planning and design preparation of production.

The process of transition from the utilization of machines being controlled by the hand of man to automatic, self-governed systems of machines represents the chief and decisive direction of the scientific-technical revolution. Thanks to

automation, the development of new sources of energy will become possible, as well as the development of space and the transition to new technology, which, as a rule, bears a "closed character", i.e., excludes the direct participation of man.

In our country, the development of automation, its quantitative and qualitative growth, are constantly being given a great deal of attention. On 1 July 1981, the number of automatic lines in the industry of the USSR came to more than 27,000,¹ including more than 4,000 in the UkSSR.² During the first 6 months of 1984, approximately 4,000 mechanized continuous production flow and automatic lines were established in industrial enterprises, and more than 2,000 sections, shops and plants³ (in the UkSSR, respectively, 635 and 600 units⁴) were transferred to comprehensive mechanization and automation.

An important technical basis of the further automation of production is the transition to the broad application of automatic manipulators (robots). More than 160 models of automatic manipulators have been created in the USSR. In the 11th Five-Year-Plan, the machine-tool industry sector produced more than 7,000 of them for servicing metal-working, wood-working and foundry equipment and about 3,000 for electroplating shops and sections.⁵ The use of robots in the non-production sphere is expanding, especially in the sphere of maintenance and the sphere of mental labor. Robot technology is also beginning to penetrate the sphere of housework.

Side by side with the machines controlling the production processes, information-dispatcher machines are acquiring broad dissemination, which exercise control over the course of production processes, the good working order of equipment, the movement of materials and semifinished products, as well as machines intended for accounting and economic purposes (calculation, estimate of expenditures and production cost, planning and calculation of the best variants of the work of an enterprise). The most important task is the creation of automated systems of control of the economic activity of enterprises and the broad use of electronic machines in management work.

The further strengthening of the material-technical base is directly related to the development of power engineering, which means:

--The requisite development of the extraction and production of the basic, most progressive energy sources. Of the greatest significance in this matter is the solution of the problem of atomic fuel on the basis of the process of the multiplication of plutonium in fast reactors;

--the appropriate development of the power engineering industry and the electric engineering industry, which must secure the creation of the necessary capacities for the production of power, the output of the needed number of power-receiving, power-transmitting, and transforming mechanisms and equipment, as well as the output of power and especially electrical engineering equipment;

--the creation and introduction of new, most advanced and efficient technological methods for the production and utilization of power, in particular--electric power;

--the development of energy production proper. In principle new in this matter must be the production of electric power in MHD-generators, which secures the direct conversion of heat into electric power;

--the construction of necessary lines of transmission for long distances with utilization of the phenomena of superconductivity;

--the production and saturation of the economy with power consumers, with the most diverse mechanisms, instruments and equipment.

In the current five-year-plan, the power industry is rising to a qualitatively new stage of development. In 1985 the output of electric power in our country will reach 1,555 billion kilowatt hours. Nuclear power is developing at outstripping rates: The introduction of capacities in nuclear power plants in the USSR will amount to 24-25 million kilowatts, and the output of electric power will reach 220-225 billion kilowatt hours and is almost equal to its production in hydroelectric power plants.

In the UkSSR the development of the power industry is being realized basically through the introduction of capacities at the Chernobyl'skaya, Yuzhno-Ukrainskaya, Rovenskaya, Zaporozhskaya, Khmel'nitskaya, and Krymskaya nuclear power plants. Their proportion of the total production of electric power in 1985 will come to 26 percent. The construction of the Odessa Nuclear State Electric Power Station is also being realized and the construction of the Dnestrovskaya Hydroelectric Power Station is being completed, as a result of which the fuel-energy balance of the republic will improve.

Thanks to the realization of the agricultural policy of the party, appreciable changes have taken place in the development of the material-technical base of agriculture. Capital investments in the agriculture of the republic for the entire complex of work increased from 21.3 billion rubles in 1971-1975 to 25.4 billion rubles in 1976-1980. During the 3 years of the current five-year-plan, their volume came to 15.8 billion rubles. In the course of 1970-1982, the fixed production assets for agricultural purposes in the public sector of the republic increased by a factor of 2.5, the capital-labor ratio increased by a factor of 2.9, and the power-labor ratio--by a factor of 2.4. As a result, the average annual number of workers of the public sector of agriculture during the same period diminished by 967,000 persons. On the one hand, this is indicative of the intensive process of the replacement of living labor by embodied labor; on the other hand, it calls forth the necessity of rapidly building up the means of production to compensate for the labor resources being released from the sector.

For the efficient utilization of the chief means of production--the land, in the republic, progressive systems of agriculture and production technology are being introduced, the agricultural management of working the soil is being improved, crop rotations are being developed, a battle against production losses is being waged, advanced methods of the utilization of fertilizer are being introduced, agrotechnical, biological and chemical means of plant protection are being applied, new high-yield varieties are being introduced, and seed production of the crops being cultivated is being improved.

One of the basic directions of the intensification of agriculture is the comprehensive mechanization of production processes. In the decisions of the May (1982) Plenum of the CPSU Central Committee it was emphasized that the paramount task of the machine building ministries, all ministries and departments of the agroindustrial complex is the completion, basically prior to 1990, of the comprehensive mechanization of agriculture and animal husbandry. With a view to the realization of this task, measures were developed and are being introduced in practice that are aimed at increasing the deliveries of technical means to agriculture, the improvement of their quality, and the output of complexes of machines and equipment for the introduction of industrial technology.

During the current five-year-plan, the agriculture of the republic will be supplied with 275,000 tractors, 242,000 trucks, 68,000 grain combines, and a lot of other equipment. The average capacity of a tractor will increase from 72 to 85 horse power, the carrying capacity of the truck--from 3.6 to 4.1 tons. Agriculture is being reliably supplied with electric power from the state power systems, which guarantees its broad utilization for production and everyday needs. During 1971-1982, the consumption of electric power in the agriculture of the UkSSR increased by a factor of 2.5. As a result of the growth of the technical equipment of kolkhoz and sovkhos production, the basic types of field work are fully mechanized, and the planting of potatoes, the inter-row cultivation of sugar beet crops, corn, the grain combining of corn, etc., are close to completion with respect to mechanization.

In spite of the sufficiently high rates of the technical reequipment of agriculture, the equipment of kolkhozes and sovkhos with machines and implements lags behind the norm. Production is experiencing a sharp demand for power-equipped tractors and the train of machines for them, fodder-harvesting equipment, trucks, tractor trailers, harrows, and other equipment. The structure of the machine and tractor fleet is in need of improvement.

The strengthening of the intensification of the agriculture of the republic is inseparably linked to the development of land improvement since a significant part of the territory is located in the zone of insecure moistening and the irrigation areas have an excess of moisture. Improved soils, whose area in the republic at the beginning of 1983 came to 4.8 million hectares, are a guaranteed reserve for the increase of the output of agricultural production. Thanks to the realization of a broad program of improvement work, there has been an appreciable increase in the role of irrigated and drained land in supplying the needs for vegetables, grain (primarily rice), fodder, and other types of production. The experience of the progressive farms of the Crimean, Kherson and other oblasts of the UkSSR testifies to the fact that every hectare of irrigated land yields 2-3 times more production than a non-irrigated one. The productivity of drained land is also higher. All the same, for the time being the plan yield is not secured on all improved lands.

With a view to the realization of the Food Program, a comprehensive plan of fodder production has been developed and is being carried out in the republic--a plan in which measures are envisaged for the improvement of field fodder production, natural haymaking and pastures, the broad introduction of advanced equipment for the manufacture and preservation of feeds, their preparation for

feeding, the increase of the production of feeds of industrial manufacture, the strengthening of the material-technical base of feed production, the creation of a system of machines for this sector, a reliable system of warehouses, depots and many others.

Progressive solutions in the improvement of the material-technical base have entailed qualitative changes in the structure of capital investments--there has been an increase in the share of capital expenditures for the active part of basic production assets and a decrease in the proportion of expenditures for construction and installation work. Thus, in the 1st Five-Year-Plan the proportion of equipment, tools, and implements in the total volume of capital investments of our country amounted to 0.8 percent; at the present time it has attained 40 percent. The formation, in the sectors of the national economy, of the number of jobs that would be balanced with manpower resources and would meet the modern achievements of scientific-technical progress is becoming the most important requirement made of the material-technical base.

At the present time, the UkSSR Gosplan and the UkSSR State Committee for Labor and Social Problems envisage the conduct, in the industrial enterprises of the republic, of the registration and attestation of jobs in order to successfully control this important national economic proportion in departmental and territorial sections in the 12th Five-Year-Plan. The experience of the Dnepropetrovsk Combine Plant imeni K. Ye. Voroshilov shows the positive influence of this work on the efficiency of production and the renewal of basic production assets. Thus, the coefficient of equipment removal came to more than 6 percent in the plant per year, which is significantly higher than in the machine building industry of the republic (1.7 percent).

Within the framework of the republic special purpose integrated program "Trud" [Labor], 217,000 persons in 1983 alone were transferred from manual to mechanized labor by virtue of the establishment of 2,210 mechanized continuous production flow and automated lines, the comprehensive mechanization and automation of 1,700 sections, shops and factories, as well as the introduction of scientific-technical measures and means of small mechanization.

The improvement of planning and the strengthening of the role of economic levers and incentives plays a special role in reinforcing the material-technical base. They not only make it possible to develop the material-technical base purposefully and systematically, but also stimulate the better utilization of its possibilities. In conformity with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Additional Measures to Expand the Rights of Production Associations (Enterprises) of Industry in Planning and Economic Activity and to Strengthen Their Responsibility for the Results of Work" (1983), a broad economic experiment is being conducted as of 1 January 1984, in which enterprises of the ministries of heavy and transport machine building and the electrical equipment industry and of the food industry of the UkSSR, light industry of the BSSR, and local industry of the LiSSR are taking part.

The enterprises participating in the experiment received broader possibilities for the strengthening of the material-technical base. In the first place, this concerns the planning of the technical reequipment of production, taking into

account the utilization of the accumulated production potential. The substantiation of the reproduction and technical structure of capital investments is now realized from the positions of securing the optimal proportions of the reproduction of basic production assets within the framework of the renovation term on the basis of their rhythmic and efficient renovation. Simultaneously limits are established with respect to jobs and limits with respect to the numerical size of the personnel. In the development of the material-technical base of the enterprises (associations), there is an increase in the role of funds for the development of production, through which measures are realized in regard to the mechanization and automation of production, the replacement and modernization of equipment, and the improvement of labor organization. The means of the fund for the development of production are fully included in the plans of capital construction of the ministries and departments and are provided on a first-priority basis with the necessary capital investments, material resources and volumes of contract work. The enterprises and associations working in the conditions of the economic experiment by virtue of the means of these funds alone secure the necessary increase in the technical level of production. Control over the rationality of the utilization of the means from these funds is realized through the assessment of the economic efficiency of the measures in regard to the technical reequipment of production, including the effectiveness of expenditures for the growth of production capacities.

The broad application of economic standards stimulates the efficient use of all types of production resources and guarantees enterprises and associations the creation of the kinds of conditions of management that secure highly-productive labor, creative initiative and socialist enterprise. The dimensions of the wage fund and the material incentives fund are directly dependent on the quality indicators of labor. Enterprises and associations carrying out the acceptance and start-up of large projects are allotted an additional wage fund for the payment of the labor of the workers engaged in making the new capacities operational. Savings with respect to the wage fund are utilized for the establishment of increments and additional payments over and above the wage rates for highly-skilled workers, engineering and technical personnel, and employees, proceeding from their personal contribution to the development and introduction of new technology and equipment and the lowering of the resource-intensiveness of production.

The strengthening of the material-technical base entails corresponding changes in the content and character of labor, which find their reflection above all in fundamental changes of the professional-skill composition of the combined labor force. Many professions of heavy labor are disappearing, new professions and specialties are making their appearance that are related to the maintenance of modern means of labor and technological processes making use of new sources of energy and materials.

The more perfect material-technical base has accelerated the growth of general and technical education of the workers and the increase of their skill. The level of skill has come to be determined not only by the sum of habits, workmanship and virtuosity, but also above all by the sum of knowledge. There is an increase in the significance of design and scientific-technical activity, the invention and testing of new machines, and the mastery of new technological processes. In connection with the fact that the scientific revolution calls

forth and accelerates a certain displacement from the production process proper to work with respect to its planning and preparation, the enterprises have an increased demand for mathematicians and technicians, scientists and research workers, and workers for supervision of modern machine-tools, the most precise measuring instruments and apparatus. The growth of the qualifications of the workers finds its reflection in the increase of the average category of the workers.

In modern production, there is an expansion of the professional profile of the workers and an increase in the level of their scientific-technical knowledge.

Modern science, technology and manufacturing methods in socialist society are changing the entire culture of labor, are making it more perfect, systematic and creative, and are making it possible to introduce such new forms of production organization as integrated brigades, a firm daily routine, an hourly schedule and precise supervision of the course of production, and methods of rhythmic production output. The strengthening of the material-technical base is creating the conditions for erasing the borders between mental and physical work, for improving socialist labor relations, for strengthening of the creative cooperation of workers, and for the broad exchange of experience and knowledge. It is the basis for the further growth of the well-being of the Soviet people.

FOOTNOTES

1. "Narodnoye Khozyaystvo SSR. 1922-1983. Yubileyny statisticheskiy yezhegodnik" [The National Economy of the USSR. 1922-1983. Anniversary Statistical Yearbook], Moscow, "Finansy i statistika", 1983, p 132.
2. "Narodnoye khozyaystvo Ukrainskoy SSR v 1982" [The National Economy of the Ukrainian SSR in 1982], Kiev, "Tekhnika," 1983, p 57.
3. PRAVDA, 22 July 1983, and PRAVDA UKRAINY, 25 July 1984.
4. EKONOMICHESKAYA GAZETA, No 33, 1981, p 1.
5. Ibid.

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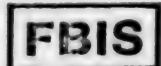
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ECONOMIC AFFAIRS



FOREIGN BROADCAST INFORMATION SERVICE

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17 April 1985

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PLANNING AND PLAN IMPLEMENTATIONS

IMPORTANCE OF OVERALL APPROACH TO PLANNING STRESSED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 12, Dec 84 pp 51-59

[Article by N. Smetanin, deputy division chief of the USSR Gosplan: "A Comprehensive Approach to Planning--A Law in the Modern Stage of Development of the Economy"]

[Text] A comprehensive approach to planning presupposes all-round investigation of the interconnected natural, material, social, organizational and other conditions of production, and, on the basis of this, planning of a more efficient combination of these in order to achieve the earmarked goals of the socioeconomic development with reduced expenditures. In other words, to approach comprehensively means to encompass the entire totality of aspects of public production in their interconnection.

The need for a comprehensive approach in planning ensued primarily from the interaction of the system of economic laws of socialism, which only in their totality depict the cause-and-effect relationship in the process of public production. Thus the effectiveness of planning becomes directly on the level of awareness and planned utilization of objective economic laws in concrete forms of their manifestation in one or another stage of the development of the society, and a comprehensive approach to planning is a quality which is internally inherent in planned management of the economy under socialism. This understanding of the nature of comprehensive planning is confirmed by the experience of our country (for example, the development of the GOELRO Plan and other large national economic programs and the comprehensive nature of each of the five-year and annual plans for the country's economic and social development).

Party and government decrees of recent years have consistently raised the problem of making the comprehensive approach all-encompassing.

The CPSU Central Committee and the USSR Council of Ministers adopted a special decree concerning improvement of the work of the USSR Gosplan which is directed "...toward strengthening the comprehensive approach to planning interconnected branches of the national economy and regions of the country and solving large economic and social problems."¹

This is related to the fact that, because of a number of reasons, in the modern stage of development of the economy a comprehensive approach to planning is becoming especially crucial.

The first of the reasons, in our opinion, is the objective need to change the economy over to an intensive, resource-saving path of development. The changeover to the new type of reproduction in long-range and current plans is manifested primarily in the reduction of proportional expenditures of resources as compared to preceding years. Thus while under the 9th and 10th five-year plans for each percentage of increase of the production of the gross agricultural product there was a corresponding increase in capital investments and deliveries of mineral fertilizers of 3-5 percent, under the 11th Five-Year Plan this increase in capital investments should amount to only 0.8-0.9 percent, and for mineral fertilizers--less than 2 percent.

But a directive reduction of the indicators of proportional expenditures of resources alone is not enough for a reorientation of the economy toward the intensive path of development since within the framework of centralized planned assignments at the basic level of production many decentralized decisions are made, which frequently caused a desire for inertia in the development of production. Under certain circumstances this can seriously weaken the results of the course that has been adopted toward comprehensive savings on resources and more effective utilization of the production potential which has been created. This is clearly corroborated by the results of the 10th Five-Year Plan.

In order to change the economy over to a resource-saving path of development and to make the process of intensification all-encompassing and long-term in nature, it is necessary to augment the centralized change in the proportions of production with a directed change in the methods of planning.

The primary basis for the methodology of planning under the new conditions is the circumstance that, as distinct from the extensive type of expanded reproduction, whereby additional allotment of capital investments and material resources served as the main means of planned influence on the dynamics and structure of public production, there are numerous factors in intensive growth. In their totality they comprise a complex system of interdependent processes and phenomena of material production and public life. Intensive growth factors of the first order are increased labor productivity, increased output-capital ratio and reduced material-intensiveness of production. The increase in labor productivity, in turn, is determined by the scope of introduction of scientific and technical achievements, the level of organization of labor and labor discipline, the effectiveness of the moral and material stimuli that are applied, the effectiveness of ideological work and the moral-psychological climate in production, in public life, in daily life and so forth. The same complex and long chain is composed of factors on which the level of utilization of fixed capital and material resources depends. To reflect the entire diversity of factors in intensive growth, their "interconnection and interdependency is possible only with a comprehensive approach to planning, taking into account the resource, scientific and technical and social factors and conditions of production, that is, comprehensively.

The second reason why the comprehensive approach to planning is so crucial is related to the transformation of the country's economy into a unified national economic complex. It embraces various units of public production, distribution and exchange and is a unity of the material and technical base of mature socialism, an economic system which has withstood the test of time and is based on public ownership of means of production and state centralized planning and management.

The functioning of the economy as a unified national economic complex is reflected directly in the sharp increase in the interdependency of all units of public production, the extensive development of interbranch production ties, and the strengthening of integration processes which embrace all or individual interacting stages of production and distribution of one product or another. On this basis there are changes in the production structure of the national economy. The branches of the national economy which have been separated during the process of public division of labor and deepening of production specialization, which are related to the manufacture of a particular product (group of products of the same kind) or by the fact that they use the same raw material, discover a tendency toward reunification within the framework of the new multibranch structures--interbranch complexes. As a result, interbranch ties expand and become more complicated, and they play a greater role as regulators of the development of various aspects of public production.

The most complex in terms of the composition of the branches included in them and their internal structure are interbranch complexes which appear on the basis of extensive development of production ties of a vertical nature among enterprises and entire branches which represent sequential stages of a unified process of production and distribution.

An example of interbranch complexes of this kind is the national economic agroindustrial complex. Under modern conditions the production of food products from agricultural raw material has gone far beyond the framework of agriculture. Many factors which determine its growth are formed in branches which are engaged in production of means of production for it, industrial manufacture, processing, transportation and storage of products, production and technical servicing, supply and sales.

The most important conditions for effectively combining these factors and, consequently, carrying out the process of reproduction are continuous improvement of production ties among the aforementioned branches in order to coordinate the entire system of material flows of products (services) of industry and agriculture and the provision of substantiated proportionality in the development of the branches.

Along with the continuing deepening of public division of labor, the generation of new functions from agriculture and the transfer of these to industry (differentiation of production) there arose a need to develop the reverse process--integration (unification) of agricultural and industrial production, which has come to be called agroindustrial integration in modern literature. This is a complex process of technological, economic and

organizational unification (merging) of interconnected stages of production, storage, processing and delivery to the consumer of food products and consumer goods made of agricultural raw material, their gradual growth into a unified process of production of particular kinds of final product, the formation of which, in turn, requires an adequate approach to planning the development of enterprises and branches which are sequential stages in this process.

Based on the appearance of a different kind of interbranch complexes is the development of ties of a horizontal nature which are called upon to regulate the production of products intended for satisfying similar needs, for example, the fuel and energy complex and the construction materials complex. As distinct from the APK the production of branches that are included in these complexes does not amount to sequential stages of a unified process of reproduction of the final kinds of products. These are rather parallel technological lines of production for producing products, which although they are different are intended for satisfying similar needs. The nature of interbranch ties in them is determined by the interreplaceability of products of the branches included in them. This means that effective satisfaction of the needs can be provided only on the basis of their intercoordinated development and, consequently, an interbranch approach is needed for planning both the fuel and energy base and the production of construction materials.

The third reason for the increase in the role of the comprehensive approach in planning is the recognition by scientific and practical workers of the fact that under modern conditions, because of the sharp increase in the scope of the economy, the complication of its structure and the multifold increase of interbranch ties, it is practically impossible to reflect many of the most important goals, means and ways of achieving them through branch and territorial plans.

Branch planning is characterized by the large number, the complexity and the dynamism of intrabranh production ties, which exert a decisive influence on the results of production. On the basis of branch plans we have solved and are solving problems of accelerating scientific and technical progress, satisfying the country's needs for products of the corresponding branches in the necessary volumes and variety, providing personnel, increasing their qualifications and other radical problems in the development of the economy. As the most important means of planned influence we use centralized allotment of capital investments, funded material resources and, in a number of cases, monetary resources.

Branch plans developed in the territorial cross-section have served to a considerable degree as a basis for preparing plans for the development of regions as well.

The branch principle of planning and management, along with its positive qualities, also has essential shortcomings. One of them is the considerable pressure on the economy from departmental interests, which are the reason for the appearance and the long duration of disproportions in the development of enterprises and branches which are closely interconnected in the process of production but belong to different departments.

The branch ministries and branch divisions of the USSR Gosplan interact poorly in solving questions of the distribution and balanced development of production capacities, more expedient utilization of resources for multiple purposes (capital investments, means of transportation and so forth) and raw materials, and the search for effective ways of achieving the final goals. This is why the effect obtained from the implementation of another in one branch sometimes ends up in increased expenditures and losses of products at enterprises of other branches and gives rise to disproportions which have a fatal influence on the results of the activity of the partners.

These shortcomings can be eliminated during the course of balancing the branch plans at the national economic level since they (the shortcomings) are not manifested in the consolidated calculations which are used for this kind of balancing. It is unrealistic to demand more detailed calculations from the consolidated and balance divisions which determine the most important national economic proportions.

In the modern stage of development of the economy the narrowness of the branch framework for solving many problems of economic growth is clearly manifested. Under the conditions of intensification, repeated increase of the scope and complication of production, the higher level of its collectivization, specialization and volumes of cooperative deliveries, and the considerable expansion and deepening of production ties, an ever-increasing number of problems of economic and social development assume clearly marked interbranch features which do not always coincide with the goals and tasks of the development of each branch individually.

Finally, branch planning does not provide an optimal solution to questions of the development of the production and social infrastructure or effective utilization of labor and natural resources.

The aforementioned shortcomings of the branch approach are somewhat mitigated by territorial planning and management which contribute to the achievement, in keeping with the development of infrastructural elements in the interests of material production, rational distribution of certain multipurpose resources (labor, water, energy and so forth) and the satisfaction of the material and spiritual needs of the population.

As a result of the systematic increase in the rights of the councils of ministers of the union republics and the local soviet agencies, the culmination of the branch and territorial principles in planning has become more balanced. Territorial planning and management is assuming an increasingly clear interbranch comprehensive nature. But the local prejudice, like the departmental prejudice, which it generates is reflected no less harmfully on national economic effectiveness. In a number of cases there is a striving to close the economy of a given region to the detriment of the interests of unionwide division of labor and interregional cooperation of production.

Were it not for these and other shortcomings of branch and territorial principles of planning and management (which can be assumed only as a scientific abstraction), their combination would make it possible to develop

and implement comprehensive, balanced plans for the development of each region. But then it would still be necessary to solve many problems related to the development of branches and territories at the national economic level. We are speaking mainly about establishing in the plans and maintaining during the course of their implementation the proportions for the development of branches and regions and rational balance of their economic growth, and also the provision of interbranch and interregional exchange of products and services on the basis of the interests of the entire national economy. Therefore among the areas for improving national economic planning a special position belongs to the development of a comprehensive approach. All the necessary prerequisites for this exist.

Our country's immense economic potential makes it possible to set and successfully resolve problems for equalizing the technical level of various branches that are included in national economic complexes and achieving proportionality and balance in their development.

Then one forms the necessary production and social infrastructure and material and financial support for the entire totality of production, social, organizational and management problems, and there is a close coordination of the goals and scope of development of the branches of the complex with the interests of more complete satisfaction of the needs of the society for the final kinds of products.

What has been said makes it possible to draw the conclusion that the comprehensive approach to planning can be regarded from the following sides:

as a method of increasing the scientific substantiation of the plan which envisions the need to account for the influence on the planned results of the largest possible number of natural, economic, social, organizational and other factors which are closely intercoordinated and comprise the totality of conditions of one production or another;

as planning of blocks of branches and spheres of activity that are related by a community of the final goal for satisfying particular needs of the society (for food, fuel and energy resources, transportation and so forth), which can be called comprehensive interbranch planning.

Bordering on this, although with its own specific features, is the development of target comprehensive programs for the development of territorial production complexes and individual territories, for example, the Nonchernozem Zone of the RSFSR.

Under modern conditions it is possible to have extensive application of all aspects of the comprehensive approach to planning. But in this article we shall henceforth consider only problems of planning interconnected branches.

Now there is every reason to speak of the existing system of comprehensive interbranch planning. Its constituent parts are:

a comprehensive program for scientific and technical progress for 2 decades in the future;

comprehensive target programs for solving especially important socioeconomic problems or the corresponding sections of the main directions for the development of the economy for the forthcoming 10-15 years;

unified plans for the development of national economic complexes.

The first two documents have already found practical application in national economic planning. There is fairly extensive theoretical research regarding these questions. We have created a particular (although it requires further improvement) methodological and organizational bases for their development and application in planned management of the economy. With respect to comprehensive target programs for socioeconomic development one can note only two aspects which, from our standpoint, have not been reflected quite correctly in a number of research papers or in the activity of the practical workers.

In the first place, the policy envisioned in the basic methodological provisions for the development of target comprehensive national economic programs for approving them along with national economic plans and including them in the latter as appendixes can be retained in the future only for programs with a small range of planning. And in cases of the development and implementation of large-scale target comprehensive national economic programs which are intended for a long period with an extensive list of assignments and measures, which are called upon in their totality to provide for priority of the selected direction or increase the target orientation of planning, it can be changed taking into account their role and nature.

An example of this can be the USSR Food Program for the period of up 1990 which embraces not only branches of the APK, but also the automotive, timber and wood-processing industry, enterprises and organizations of the construction complex and so forth.

These programs become a constituent part of the basic directions for the socioeconomic development of the country, republic or region. Like the basic directions, after approval they must be regarded as a directive or goal-orienting (with a considerable range encompassed by the program) document for the development of five-year and annual plans for the economic and social development of the country and the corresponding regions.

In the second place, even with all their significance target comprehensive programs cannot provide for universality of the comprehensive interbranch approach in planning since they are developed only for individual problems which are the most important in the development of the economy. A comprehensive interbranch approach to planning is possible only with the development, along with target comprehensive programs (food, fuel-energy and so forth) of unified plans for proportional and balanced development of enterprises and branches which are closely intercoordinated in the process of producing particular kinds of final products (services) and which in their totality comprise national economic complexes (agroindustrial, fuel-energy, construction materials and so forth).

In order to strengthen the comprehensive approach to planning, to provide for deeper and more comprehensive analysis of the economy, and to provide a plan for the development of interconnected branches and spheres of activity which is balanced and coordinated in terms of all its indicators, the USSR Gosplan has created administrations for comprehensive planning which are headed by deputy chairmen of the USSR Gosplan. An institute of authorities of the USSR Gosplan has been established in four economic regions (Ural, Western Siberian, Eastern Siberian and Far East). In the central staff of the USSR Gosplan subdivisions have been created for comprehensive territorial planning of the Nonchernozem Zone of the RSFSR, Siberia and the Far East.

At the present time we have a certain amount of experience in intercoordinated planning of blocks of branches which in their totality represent large interbranch national economic or territorial production complexes which already exist or are being formed. And although many questions of methodology, methods and organization of this work remain questionable, the experience that has been accumulated makes it possible to formulate certain of the most general requirements for the new sections of the plan.

As we know, any national economic complex is a complicated multibranch structure. Effective planned management of it requires adequate depiction of this structure in the plan. This brings about the need to plan the complex not only as a unified whole, but also with the breakdown of the branches. Moreover, the plan for the development of one or another complex is not a simple sum of branch plans. Its development presupposes, in the first place, more rigid orientation of the branches toward the achievement of the final goal as a result of the introduction of new or the adaptation of already existing indicators and, second, the augmentation of the branch cross-section with a new comprehensive interbranch section of the plan which should not either duplicate or replace the existing planning.

But what is the content of this section? From the standpoint of reproduction the object of comprehensive interbranch planning is composed of the proportions of development and production ties that arise at the junctures of the branches or the enterprises of the interbranch complex which in the branch plans are either not considered at all or are considered from the positions of only one branch and at the national economic level cannot be manifested because of the high degree of aggregation and generalization of the calculations.

The main tasks of the development of the comprehensive interbranch section of the plan can be designed approximately in the following generalized form:

the establishment of volumes of production of the final product for the planned period taking into account the needs of the national economy and the most effective utilization of the complex of capacities and allotted resources existing in the branches;

the formation for the planning period of interbranch proportions for the development of the complex in order to maximally increase the production of products with the resources that are allotted;

coordinated and mutually determined distribution on the territory of the country or region of production capacities that are included in the complex of the ministries, departments, associations and enterprises for satisfying the needs of the consumers with the minimum of production, transportation and operational expenditures;

the provision of balance of those units of public production within the framework of the complex which are not reflected in an intercoordinated way in the branch plans and are not the object of national economic balancing;

substantiation of the needs of the complex for resources and services that are offered by branches that are not included in it and the defense of these in the corresponding organizations or their subdivisions;

the distribution of capital investments and material resources that are allotted for multipurpose utilization taking into account the needs of the branches of the complex and the solution to problems of an interbranch nature.

The content of the new interbranch section of the plan does not end with the aforementioned calculations and assignments. But they determine the appearance of this section and the goals for which it is to be developed.

In addition to what has been pointed out, in order to give the new section of the plan a certain integrity and finalization during its formation, in the stage of control figures we will determine the need of the national economy for the final kinds of products of the complex and the preliminary possibilities of satisfying them, and also the most significant changes in the interbranch and intrabranh production structure that ensue from this. Here the most important initial data will be efficient norms of consumption (expenditure) of various kinds of products, their allowable interreplaceability, the level of utilization of the production apparatus of the branches of the complex and reserves for increasing it, and resource capabilities of the national economy.

There also arises a need to develop such consolidated indicators as the rate and scale of increase of the production of the final product, increased labor productivity and wages of the workers, structural changes within the complex, and also a whole number of other indicators that characterize its development as a whole.

The means for solving the aforementioned problems in various complexes will be determined, from our point of view, by the nature of the interbranch ties that are inherent in each of them. Thus with respect to the national economic agroindustrial complex the planning methodology should arise from the unified process of production of each kind of final product that has taken form during the course of public division and cooperation of labor which, as was noted, requires an adequate approach to planning the development of enterprises and branches which are sequential stages of this production. The corresponding sections of the plan with their intercoordinated assignments and measures should embrace all links of the technological chain from production to wholesale (and in a number of cases retail) sales of the final product to the consumer.

For meeting these requirements the following will be of decisive significance:

preparation of a comprehensive interbranch section of the plan for the development of the APK in the cross-section of vertically integrated product subcomplexes;

the system of product, capacity, labor and other balances, including the interbranch balance developed with respect to the APK;

the change in the policy for the distribution of resources for complex wide purposes and their coordination with the assignments for developing the agroindustrial production which provides for the orientation of the branches of the APK toward the final results.

The vertically integrated product subcomplexes which embrace blocks of branches, subbranches and enterprises for producing, processing, transporting, storing and selling specific kinds of agricultural raw material and products from its processing and also producing (delivering) means of production which are specific for the given block are becoming not only the content, but also the form of development of the comprehensive interbranch section of the plan.

Within the framework of these subcomplexes the basic work will be carried out for optimization of proportions and provision of balance of the development of all units of the unified technological process for the production of each kind of final product or group of homogeneous products, which is directed toward the achievement of correspondence of the internal structure of the subcomplex and its individual parts to the final interests of the functioning of the APK.

The main instrument for providing for the necessary proportions in the development of all interacting units of the APK will be the system of balanced calculations. Its constituent parts are: the interbranch balance which is developed with respect to the national economic agroindustrial complex, balances of production capacities in the main kinds of products which are compiled within the framework of vertically integrated subcomplexes, the balance of labor resources at the agroindustrial complex, and others. The composition of the system of balances will be fully determined during the course of the establishment and perfection of the methodology and practice of planning the APK.

Comprehensive planning is called upon to provide a policy in the distribution of capital investments and material resources allotted for the APK as a whole whereby in each given stage it is possible to use them for the development of units which determine the results of the functioning of the entire technological process.

To these ends, in the stage of control figures when preparing the drafts of the plans for the next period, it would be expedient to formulate and inform the union republics of the limits on capital investments and material resources for general complex purposes, and in the republics they should inform the krays and the oblasts for the entire agroindustrial complex as a whole without a breakdown for the various branches. At the same time the

ministries and departments of the USSR should establish limits on capital investments and the corresponding material resources for the realization of unionwide goals.

Based on the earmarked increase in the production of foodstuffs and agricultural raw material and the existing structure of the agroindustrial complex of the given region, the territorial agencies should develop proposals for the distribution of the capital investments and material resources allotted to them among the branches and enterprises of the complex. On the basis of these the central agencies, with the participation of the union republics, will form the branch cross-section of investments and material resources for the forthcoming period.

This approach will make it possible to achieve smooth operation of all units of the APK and to take into account as much as possible local proposals as well as to provide for coordination of branch and territorial plans and the drawing up of balanced plans for the development of the agroindustrial complexes of the individual regions.

When planning other national economic complexes the means of planned influence on solving interbranch problems and interbranch balancing will be different. But in all cases they should affect the consideration of the complexes of interconnected branches as a unified whole both in terms of the final results of their functioning (volumes and effectiveness of production) and in terms of the resources that are allotted.

It is necessary to draw up more actively unified plans for the development of national economic complexes so that under the 12th Five-Year Plan it will be possible to basically complete the formation of a system of comprehensive interbranch planning.

FOOTNOTE

1. "Materialy XXVI S"yezda KPSS" [Materials of the 26th CPSU Congress], Moscow, Politizdat, 1981, p 125.

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PLANNING AND PLANNING IMPLEMENTATION

TARGETS FOR LAST YEAR OF FYP RESTATED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 12, Dec 84 pp 3-8

[Article: "The Plan of the Final Year of the Five-Year Plan"]

[Text] The State Plan for the Economic and Social Development of the USSR for 1985, which was adopted by the second session of the USSR Supreme Soviet, directs labor collectives of the country toward the achievement of new goals in industrial and agricultural production, transportation, capital construction, including the introduction of new residential buildings and facilities for social and cultural purposes, and toward more extensive utilization of the achievements of science and technology as a decisive condition for increasing labor productivity, increasing the effectiveness of production and improving the quality of products that are produced.

The assignments of the plan of the final year of the 11th Five-Year Plan reinforce and develop the positive tendencies that have been achieved recently in the development of the branches of the national economy and provide for the most important proportions determined by the 26th CPSU Congress. Thus in 1984 the rates of development of the economy in terms of the main indicators are expected to be at the level earmarked by the plan for this year, and some of them should be higher. The national income will increase this year by 3.1 percent, as was envisioned by the plan, and industrial production--by 4.4 percent as compared to 3.8 percent according to the plan.

Assignments for increasing the effectiveness of public production, mainly increasing labor productivity, are being fulfilled. In industry it exceeds 4 percent as compared to 3.4 percent according to the plan, as a result of which more than 90 percent of the increase in industrial output will be achieved, and in agriculture and rail transportation all of the increase will be achieved as a result of this factor.

We are close to fulfilling the assignments for above-plan increase in labor productivity by 1 percent and reduction of production costs by 0.5 percent.

The expected positive results for 1984 show the expansion of the influence of intensive factors on the development of branches of the national economy on the basis of improvement of production technology, labor organization,

increased discipline and more extensive introduction of scientific and technical achievements.

This year about 4,000 models of new types of machines, equipment, devices, instruments, materials and means of automation are to be created and the application of robots is to be expanded.

The achievements in the sphere of material production are being favorably reflected in the social development and in the higher standard of living of the people. The real per capita income of the population will increase in 1984 by 3.3 percent as compared to 3.1 percent according to the five-year plan for this period, and the monthly earnings of workers and employees and the wages of kolkhoz workers will also increase. Construction workers will construct about 114 million square meters of overall dwelling space in residential buildings, which will make it possible to improve the housing conditions for approximately 10 million people.

The results of the fulfillment of the 1984 plan for 9 months show the positive tendencies in the development of the economy. Thus the plan for product sales was fulfilled by all industrial ministries and union republics. Labor productivity increased by 3.7 percent and 94 percent of the increase in production was achieved as a result of this. Labor productivity during this period outstripped the growth of average wages. The planned volume of production of consumer goods was achieved.

Still, in spite of the marked improvement of the state of affairs in the development of the country's economy, we have not been able to fully compensate for the arrears that existed during the first 2 years of the five-year plan with respect to individual indicators. Plans of the five-year plan were not fulfilled for the production of agricultural products, there are arrears in the implementation of assignments for the introduction of new technical equipment and technology and to production economizing on material resources, and introducing fixed capital and production capacities. During the 9 months assignments were not carried out for the extraction of petroleum, the production of commercial timber, synthetic resins and plastics, chemical fibers and threads, chemical equipment, machines and equipment for animal husbandry and feed production, and so forth.

Therefore in the final year of the 11th Five-Year Plan it will be necessary to solve a number of problems, which will contribute to the stability and the development of the economy, taking into account the fact that the results of 1985 will be the basis for the development of the draft of the plan for the 12th Five-Year Plan.

In connection with this a number of peculiarities are inherent in the 1985 plan. Next year the absolute growth in terms of a number of the most important indicators will increase as compared to 1984; the volumes of capital investments used for technical re-equipment and reconstruction of existing enterprises will increase; the regimen of economizing on raw materials, fuel and energy and process material resources will be strengthened; more difficult assignments will be determined for the indicators of the effectiveness of public production, mainly increased labor productivity and improvement of the

utilization of production capacities and fixed capital, as a result of which there should be an increase in the volumes of industrial production without enlisting additional labor force. This is conditioned by the need for extensive introduction in all branches of the national economy of a complex of measures for accelerating the introduction of the latest achievements of science and technology, automation and mechanization, scientific organization of production, the development of collective forms of labor, improvement of labor incentives, and improvement of norm-setting for labor.

Another typical feature of 1985 is expansion of the economic experiment. The results of the operation of the enterprises of five branches--Ministry of Heavy Machine Building, Ministry of the Electrical Equipment Industry, Ministry of the Food Industry of the Ukraine, Ministry of Light Industry of Belorussia and Ministry of Local Industry of Lithuania--in 1984 showed the positive influence of the experiment on the results of their work. The enterprises have been given greater rights and greater responsibilities, and they have been relieved of excessive red tape from central agencies.

Beginning on 1 January 1985 enterprises of a number of other ministries will be changed over to the conditions of the experiment, which will embrace branches of machine building, light and the food industry, fishing, local industry and consumer services. These enterprises will produce 12 percent of the output in industry. Under the conditions of the experiment the role of economic levers and stimuli which includes the final results of the activity of the enterprises increases.

Labor productivity in industry in 1985 will increase by 3.7 percent, construction--by 3.5 percent, and rail transportation--by 2.1 percent.

The assignments of the plan for increasing labor productivity in the branches of the national economy presuppose local development of concrete measures which provide for their fulfillment. There are now more than 50 million people employed in manual labor in the national economy. Their proportion is great in construction, agriculture, the coal industry, the food industry, trade and auxiliary work. In order to gradually reduce manual labor, in 1985 work will be continued for certification and streamlining of work stations, the collectivist foundations for production will be strengthened, and brigade forms of organization and stimulation of labor will be utilized more effectively. For example, calculations show that as a result of the implementation of measures for scientific organization of labor (NOT) labor productivity in industry can be increased in 1985 by more than 2 percent.

An important feature of 1985 is the currently developing competition for a worthy greeting for the 40th anniversary of the victory of the Soviet people in the Great Patriotic War. This patriotic initiative of the workers of the hero cities was a response to the decision of the CPSU Central Committee to celebrate the glorious anniversary of our people's feat of arms as a national holiday. The memorial watches are distinguished by a desire to achieve new labor goals. The mining brigade of M. Chikh (the Pervomayskaya mine in Rostov Oblast) made a commitment to be the first branch in history to extract 1 million tons of coal a year from thin layers, and the metallurgists of the Serp i Molot Plant in the capital conducted the first of 40 shock weeks which

the leading enterprises of Moscow have resolved to devote to the 40th anniversary of the victory. Participants in the memorial watch are finding many effective means and methods of increasing the militancy of the competition in the struggle for increasing labor productivity and economizing on material resources.

In 1985 the national income which is used for consumption and accumulation in the interests of all members of the society will increase by 3.5 percent, industrial production--3.9 percent, agricultural output--6.7 percent, cargo turnover on transportation--3.3 percent, including rail transportation--1.8 percent, and the volume of capital investments from all sources of financing--3.4 percent. The social program envisions increasing real incomes of the population by 3.3 percent, public consumption funds--5 percent, and commodity turnover--5.2 percent.

The increased volumes of industrial production will be accompanied by qualitative changes. The plan envisions more rapid growth of the processing branches, whose output volume will increase by 4.4 percent, and output from machine building and metal processing will increase by 6.5 percent. In the fuel and energy complex the extraction of gas will increase. For the complex of construction materials it is typical to have growth of volumes and improvement of the structure of production as a result of higher rates of increase in the output of effective materials. In ferrous metallurgy, for example, the production of economical and efficient kinds of metal products will increase at more rapid rates, which will make it possible to save 13 million tons of rolled ferrous metals in the national economy. In the chemical and petrochemical industry, with an overall increase in production of 5 percent, the production of synthetic resins and plastics will increase by 8.6 percent, soda ash--by 6.9 percent, mineral fertilizers--10.6 percent, and chemical means of plant protection--3.8 percent.

In machine building primary attention will be devoted to increasing the production of machines and equipment which provide for increasing labor productivity in all branches of the national economy. In 1985 there will be a considerable increase in the production of flexible automated production models and systems. The output of automatic manipulators (industrial robots) will increase by 14 percent and will reach 14,300 units.

Progressive technical equipment will be directed primarily toward the fulfillment of assignments of the Food and Energy programs, expansion of the scope of introduction of resource-saving technologies and support for startup projects of 1985, and also technical re-equipment and reconstruction of existing enterprises.

The volume of production of light industry products will increase by 3.5 percent, and goods for cultural-domestic purposes and household use--by 6 percent.

There will be further development of the agroindustrial complex, within whose framework more than 30 percent of the national income will be produced, approximately 95 percent of the food supply will be formed and more than 70 percent of all commodity turnover will be provided. In the modern stage

greater requirements are being placed on the agroindustrial complex. An important role in its development was played by the May (1982) Plenum of the CPSU Central Committee, which adopted the country's Food Program. The main goal of the program is to provide the country's population with food products in the shortest possible periods of time. The average annual production of agricultural products is increasing from year to year. While under the 7th Five-Year Plan it amounted to 83 billion rubles and under the 10th--124 billion, in 1983 agricultural products were produced in an amount of 135 billion rubles, and during 1983-1984 approximately 20 billion rubles' worth more were produced than during the first 2 years of the 11th Five-Year Plan.

In 1985 as compared to 1984 the gross agricultural output will increase by 9 billion rubles, and the entire increase is to be achieved as a result of increasing labor productivity. The decisions of the October (1984) Plenum of the CPSU Central Committee, which adopted the decree, "On the Long-Term Program for Land Reclamation and Increased Effectiveness of the Utilization of Reclaimed Land for Purposes of Steadily Increasing the Country's Food Supply," will also contribute to successful development of agriculture and the agroindustrial complex as a whole. By now the overall area of irrigated and drained land has reached 33 million hectares. During 1986-1990 it is intended to introduce another 3.34 million hectares of irrigated and 3.6 million hectares of drained land, which will make it possible in 1990 to obtain from this land up to 32.3 million tons of grain, including 9.1 million tons of corn, up to 80 million tons of feed units, and up to 22.5 million tons of vegetables from irrigated land. And by the year 2000 the area of irrigated land will be expanded to 30-32 million hectares and drained land--to 19-21 million hectares, with an increase in the production of grain on this land to 55-60 million tons, including corn--up to 18-20 million tons, and feeds--up to 115-125 million tons of feed units.

The earmarked program of land reclamation has been accepted by the workers as a militant task in providing the country's population with food products and, on the basis of this, improving the well-being of the Soviet people.

Responsible tasks have also been set for workers of other branches of the agroindustrial complex, especially "processing products and improving the supply of the population with foodstuffs."

The utilization of secondary raw materials is becoming more and more important. Its volumes as envisioned by the draft of the plan will make it possible to save a considerable quantity of primary resources, including about 50 million cubic meters of wood translated into round timber, more than 80,000 tons of synthetic rubber, more than 100,000 tons of soda ash and so forth.

The role of transportation in the country's economy increases each year. The scope of transportation construction is expanding. During 3 years of the five-year plan more than 1,500 kilometers of new railroad lines and 2,500 kilometers of sidings were constructed and put into operation. Almost 3 million kilometers of railroads were provided with electricity and 7,000 kilometers were equipped with automated blocking. This year the last, the "gold" link of the Baykal-Amur Mainline was installed.

The large new transportation artery is important for the development of our country's economy, especially of Eastern Siberia and the Far East, for the creation of territorial production complexes in these regions, and for bringing rich natural resources into national economic circulation.

The cargo turnover for all kinds of transportation in 1985 has been determined taking into account the earmarked levels of production and volumes of capital construction. The existing network of railroads will be further developed and new ones will be constructed. More than 1,300 kilometers of railroad lines will be put into operation.

Capital construction is assuming a new scope. In the national economy as a whole capital investments will amount to 175.1 billion rubles, of which 90.6 billion rubles will be for construction and installation work. Special significance is being attached to the fuel-energy and raw material branches, and also machine building.

Capital investments in the development of agriculture for the entire complex of work will be in larger amounts than envisioned in the five-year plan for this year. In keeping with the decisions that were made, some of the investments will be used for the development of industries which manufacture equipment and machines for agriculture, the microbiological industry and several other branches.

Capital investments in technical re-equipment and reconstruction of existing enterprises will amount to more than 30 billion rubles. This is higher than the 1984 level and the assignments of the five-year plan for 1985.

New production capacities will be put into operation in 1985, as a result of which the plan envisions the necessary concentration of capital investments, material resources and capacities of contracting construction organizations on start-up projects and the most important carryover projects, which will provide for proportional development of the national economy and elimination of existing interbranch and intrabranh disproportions.

In the final year of the five-year plan a greater role will be played by science and technology in improving the work of the branches of the national economy, increasing their effectiveness, and improving the quality of the products that are produced. The scale of the assimilation of modern new equipment for newly created, reconstructed and technically re-equipped enterprises and industries will be increased.

Comprehensive automation of production will still be the main direction. The Politburo of the CPSU Central Committee, attaching primary significance to this, at its meetings approved measures for acceleration of the automation of machine building on the basis of advanced technological processes and flexible adapted complexes and systems of automated planning, and it has considered the question of the introduction into the national economy of highly productive automated rotor and rotor-conveyor lines. The decisions it adopted regarding these issues constitute a developed program of technical re-equipment of production on a principally new basis. These tasks must be carried out

comprehensively, taking into account the fact that in the creation, for example, of flexible production systems it is necessary to have the immediate and actually simultaneous participation of technologists, programmers, specialists in electronics, robot equipment and software, and specialists in means of diagnosis and automated control. Such an approach places great requirements on the workers of the enterprises, designers and planners.

In the national economic plan for 1985, taking into account the plans of the ministries and departments, it is earmarked to assimilate 4,200 new kinds of machines, equipment, instruments and materials or 7.7 percent more than the 1984 plan, and it also contains about 500 assignments for introducing producing technological processes and means of mechanization and automation of production. There is to be further technological updating of production and increased utilization of progressive resource-saving technologies, including such important base technologies as continuous smelting of steel, the production of cement by the dry method, more thorough processing of petroleum and gas, and comprehensive utilization of raw material.

Measures will be taken for further reduction of manual labor, which envision comprehensive production of systems of machines for mechanization and automation of lifting-transportation, loading-unloading and warehouse work. As a result of the higher technical level of production in industry it is intended to conventionally release about 800,000 people, to transfer more than 400,000 workers from manual labor to mechanized labor, and to obtain a savings from the reduction of production costs of about 5 billion rubles.

The final goal of all the assignments that have been envisioned for the development of the country's economy in 1985 is a further rise in the standard of living of the people. Monetary and real incomes of the population will increase as will retail commodity turnover and public consumption funds.

The volume of services rendered the population will increase by 6 percent, including in rural areas--by 7.1 percent.

From all sources of financing it is intended to construct residential buildings with an overall area of 114 million square meters, which is 10.7 million square meters more than was earmarked by the five-year plan for this year, and for the five-year period as a whole--555 million square meters, or almost 25 million square meters more than envisioned in the assignments of the five-year plan. This will improve the housing conditions for more than 50 million people.

There will be further development of public education, culture and public health. The network of institutions for these branches will expand considerably, and the social and cultural service for the population will improve.

Delivering a speech at the meeting of the Politburo of the CPSU Central Committee, which considered the draft of the State Plan for the Economic and Social Development of the USSR and the USSR State Budget for 1985, general secretary of the CPSU Central Committee, chairman of the Presidium of the USSR

Supreme Soviet, K. U. Chernenko emphasized: "The plan must be unconditionally fulfilled, and where it is possible and necessary--overfulfilled."

Our country's labor collectives have accepted the assignments of the plan of the final year of the 11th Five-Year Plan as an important program of action which is directed toward dynamic and proportional development of the economy, increased effectiveness of public production on the basis of increased return from each invested ruble of material and financial expenditures, each working minute, and the strengthening of planning discipline and responsibility in all areas of administration of the economy, as is required by the modern stage of our development.

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INVESTMENT, PRICES, BUDGET AND FINANCE

AUTOMATION OF GOSBANK OPERATIONS DESCRIBED

Moscow DEN'GI I KREDIT in Russian No 11, Nov 84 pp 20-24

[Text] During the current five-year-plan, the automation of the accounting and calculation being performed in the State Bank of the USSR has received further development. At the present time, the information of many institutions of Gosbank is being processed by electronic computer equipment.

During the 4th quarter of 1983, with respect to the "Operation Day" task alone, more than 79 million documents were processed. The processing of this information is done by on-line operation since its transmission from the institutions of Gosbank to the computer center is effected mainly through communication channels in the mode of dialogue interaction of the operators of the institutions of Gosbank with the computer processing center. The processing is done according to the arrival of the last documents and ends by the end of the current day, and the processing results (extracts from personal accounts and other forms) are transmitted to the user by no later than 7 am of the following day.

The technological process of integrated information processing in regard to accounting and calculation work on an electronic computer has great advantages in comparison with its processing with punchcard calculator (tabulation) and key-operated equipment, which is being used in the information computer systems (IVS) and in the departments of Gosbank. For this reason, there was a transition of accounting and operating information from tabulation equipment to so-called punchcard calculators (SPM) of the Type M-5000, which pertain to computers of the third generation. In the beginning stage of their use, the process of preparing the source information did not in any way differ from preparing the data through the punching of punchcards for their processing on tabulators. The input of information on tasks being solved on the electronic computer, which is realized on the basis of the utilization of an intermediate storage device (the punchcard), creates a number of significant difficulties of a technical and organizational character, moreover it is also uneconomical. Its uneconomical nature consists, in particular, in the fact that the storage device is used only in a single order and requires the expenditure of a large quantity of paper that is in short supply. The punching itself and the input of information from the punchcard require significant labor expenditures to control the correctness of the transfer of the information and its correction.

For this reason, subsequently, with the beginning of the industrial production of the means of preparing information on magnetic media, such as the equipment

for the preparation of information on magnetic tapes (YeS-9002) and systems for the preparation of data on magnetic discs (R-810), developments were begun on the use of such means in the conditions of the Gosbank system.

As a result of the mastery of the technology of data preparation and a number of organizational measures guaranteeing the necessary reliability of the information preparation, equipment for data preparation on magnetic tapes began to be used in departments of Gosbank with a small volume of information, and systems for data preparation on magnetic discs began to be used for information preparation in urban departments of oblast offices of Gosbank and in large departments of Gosbank.

The distinctive feature of the use of this equipment for the preparation and input of information in electronic computers is the fact that the information, which is autonomously recorded on magnetic storage devices, can be processed by electronic computers during the swap of the storage device from data preparation equipment to equipment which is part of the machine. In so doing, the storage devices are utilized over and over right up to their complete physical wear and tear.

For data preparation from primary documents on magnetic discs, the R-810 system is used, which is intended for keyboard data sets and in terms of its functional structure is an autonomous system of information preparation, which secures the input of data from several simultaneously operating keyboards and the accumulation of the information being introduced in the memory on a magnetic disc. The system gives every one of the operators the possibility of the input of records (strings of primary documents) within the limits of 1 to 240 alphabetical and numerical characters and their carry out to a magnetic disc in the zone set aside for every operator. In every sector of the zone of the magnetic disc set aside for an operator, from 1 to 15 records can be placed, with their summary capacity not exceeding 256 bytes. The summary capacity of the surface of a magnetic disc is distributed depending on the number of working operators.

The system secures the arbitrary distribution of magnetic disc capacity among the operator consoles through the preliminary input, in the buffer memory, of contiguous addresses of tracks and sectors of the magnetic disc, which are set aside for the work of every one of the operators, moreover, everyone of them may be allotted quite a number of tracks.

The R-810 System provides for program control of the data input process from a keyboard in accordance with the assigned format of the primary document. The program secures: Control of the data being entered on the basis of control character "digits", "Latin letters", "Russian letters", "information separators", the automatic execution of duplication operations, the automatic execution of throughput operations, the automatic execution of the shift of the indicator in the field to the right with the complement by zeroes from the left, and the automatic check of the data being entered on the basis of the control sum. The program of the record of the data being entered is formed within the capacity of one document and during the work of the operators is stored in the buffer memory in the zone set aside for the work of every one of the operators.

The entry of the program in the buffer memory is effected by the operator from the control console, or by address request of the operator from the magnetic control disc, or by address request of the operator from a magnetic disc of R-412 memory.

Up to 8 consoles with simultaneously working operators may be connected to the R-810 System. The information entered in the R-810 System in independent mode on a magnetic disc is transferred to a Type M-5000 Computer by means of the transposition of the monodisc in the R-412 memory, which is a component part of the machine itself and subsequently, after the appropriate check and correction, is processed in accordance with the "Operation Day" Program.

The technological process of entering information in the computer has become significantly simpler by comparison with the entry of data from punchcards since the labor-intensiveness of information processing on the computer diminished.

After mastering the method of information preparation described above both in the program and organizational respects, the problem of preparing and entering information in the Type M-5000 Computer in the urban institutions of Gosbank was solved to a certain degree. As far as service of the remote departments in the oblasts by the computer center is concerned, it can be noted that, after the transfer from the tabulation equipment of the information computer systems to the Type M-5000 Computer, the process of the transfer and entry of information through communication channels became more perfect, since, in particular, the necessity of the aggregation of teletype with the card punch was eliminated, which was a necessary condition for receiving card punches in the information computer systems (the aggregation was necessary in order to receive card punches on the receiving side during the information processing by means of tabulation calculators). During the transfer of the information processing to the Type M-5000 Computer, the punch card carrier is at once replaced by a perforated tape, and the information that is received through communication channels from the departments of Gosbank, which is punched by teletype on perforated tape, can be directly entered in the computer from the perforated tape with the aid of an input device. As a result, there is a significant reduction in the number of errors in the information that is transferred, since all the errors inherent in the teletype-perforator system aggregation system are excluded.

With the transfer of information processing from tabulation calculator equipment to Type M-5000 Computer, two M-5010 Computers each were installed in the computer centers. The computer centers of 12 oblast and republic (without oblast division) offices of Gosbank were equipped with these machines. After the phasing out of the M-5010 Computers, the centers began to be equipped with two M-5100 Computers; as many as 14 computer centers of Gosbank offices are operating on the basis of these machines.

The M-5100 Computer System (VK) is a further development of small Type M-5000 Computers and represents the model following the M-5010.

The expanded configuration of the M-5100 Computer System, which includes the additional equipment: R-810 System for data preparation on magnetic discs and an alphanumerical printer (ATsPU 128-3M), makes it possible to speed up the solution of the "Operation Day" task.

A complex of programs guarantees the efficient utilization of the technical means, the achievement of their maximum productivity and simplicity of their maintenance, and the improvement of the organization of the solution of tasks.

The programs of the complex are consolidated in a so-called operating system, which is composed of: The control program, the program operation system, program translators and generators, and standard modules.

The complex solves the following tasks: "Operation Day", "Receipt of Inter-Branch Turnover", "Control of Inter-Branch Turnover" at the level of association, and "Statistical Accountability".

The presence of an external memory on removable magnetic discs in the composition of the M-5000 Computer Systems not only increases the efficiency of the information processing [carried out] by them in comparison with the processing of tabulation calculator equipment, but also improves the organization of the storage of large masses of data, simplifies the work in regard to the preparation and check of source information, and reduces the erroneousness in the data processing process.

A special effect is attained in the processing of cash accounting records. As is well known, in the processing of these records by tabulation calculation equipment, the summarized data concerning the balances that have come into being as the result of the turnovers of the sums for the personal accounts of clients, after every solution of the "Operation Day" task, are perforated on punch cards (the creation of balance punch cards), which the next day are processed together with the turnover punch cards. These punch cards are used only a single time.

With the transfer of the tasks to the Type M-5000 Computer System, all summarized data are recorded and preserved on magnetic discs and can be rerecorded on them repeatedly. This makes it possible, in addition, to economize a large volume of punch cards.

The use of tape units in the Type M-5000 Computer System guarantees the long-term storage of individual masses of information and also makes it possible to effect, on the basis of magnetic tapes, the exchange of information between separate systems, and with the appropriate organization of the work--also between computer centers equipped not only with Type M-5000 Systems, but also with YeS computer series.

The institutions of Gosbank receive significant advantages from the processing of information on electronic computers and the use of new technical means in the computer centers. A large contribution to the development of the technical algorithm of the task "Operation Day" and "Receipt of Inter-Branch Turnover" and to the programs of these tasks for the Type M-5000 Computer was made by a small collective of the computer center of the Penza Oblast Office of the USSR Gosbank. The specialists of this center--V. R. Sadovskiy, L. A. Zhogova, and

others--not only were the authors of the development of the programs, but also took an active part in their introduction in other Gosbank offices, extending skilled advice at the local level.

However, in talking about the positive factors in the introduction of small Type M-5000 Computers in Gosbank, it is impossible not also to talk about some negative aspects. The point is that the disc units that go into the M-5000 Computer, in particular the monodiscs (cassettes), have a low reliability. The Vil'niyus Sigma Production Association for Computer Equipment, which produces them, does not guarantee the delivery of the necessary quantity of such information carriers to the consumers, and for some incomprehensible reason it has stopped accepting the monodiscs that have failed for repair and recoating. This circumstance makes the normal operation of the Type M-5000 Computers more difficult and can lead to service of insufficient quality to economic organizations by the institutions of Gosbank.

It follows from what has been stated that the transfer of banking institutions to automated information processing on the basis of small Type M-5000 Computers, with the replacement of tabulation calculator equipment, produces a definite effect. The efficiency of the use of these computers can be even higher if measures are taken with respect to the more extensive transfer of the institutions of Gosbank to service by computer centers, the reserve of computer capacity of which exists in the majority of cases.

The delivery of information over long distances from the remote institutions of Gosbank to the processing center and back remains a problem. This holds back the acceptance of a large number of departments subordinated to a given office for service by the computer center. Analysis shows that in regions, where good transportation service is available, the number of accepted Gosbank institutions is higher in the oblast. For example, the Kaliningrad Oblast Office of Gosbank secured the complete information processing transfer of all Gosbank institutions in the oblast.

The method of the delivery of information through telegraph communication channels, with the use of perforated tape, which is presently being used in computer centers equipped with Type M-5000 Computers, has significant shortcomings--although it is more perfect by comparison with the preparation of information on punch cards. First of all, an intermediate information carrier--the perforated tape--is again required, and, secondly, the control, adjustment and correction of the information entered in the computer are in this case difficult and require the participation of special personnel for adjustment, both in the department of Gosbank and in the computer center. The adjustment problems consist in the fact that it is practically impossible to operationally establish a telephone or other link between the adjusting sides since the source documents are located in the department of Gosbank.

For the time being it does not seem possible to organize a system for the transfer of data through communication channels from Gosbank departments directly to a Type M-5000 Computer because of the lack of output, by industry, of the technical means of interfacing these machines with communication channels, which secure the efficient transfer of information, taking into account the banking conditions of its processing. For this reason, the specialists of Gosbank are

confronted with the task of creating a system of the automation of banking operations which would meet the specific features of the processing of banking operations to a greater degree. With this in mind, work is being done in the State Bank on the creation of a sectorial automated control system (OASU of the USSR Gosbank). Taking into account the fact that this subject is too vast, we touch only on part of this problem as most important for the State Bank, and that is the creation of the means and the system of data transmission over long distances.

In the system of Gosbank for data transmission over long distances, extensive use is made of the telegraph communication network. In so doing, the telegraph sets are used as terminal devices for computers in the departments of Gosbank. In the computer center, the channel is interfaced with the aid of specialized equipment directly with the computer. Special programs secure the transmission of data with the simultaneous control of subjective errors of the operator, hardware-controlled and channel errors.

Telegraph channels are leased at the enterprises of the USSR Ministry of Communications. The telegraph sets and the apparatus for interfacing the communication channels with the computer are under the jurisdiction of Gosbank.

The experience of the work has shown that, for a whole series of reasons, the telegraph set does not meet the specialized requirements for the processing of banking information in view of the fact that it lacks, in particular, the ten-key numerical keyboard, which could be used by operators with data sets on non-cash transactions by the "blind" method, which doubles the speed of data sets.

At the present time, special hardware has been developed for the teleprocessing of data of the USSR Gosbank sectorial automated control system. A short characterization of this equipment is as follows: The hardware (KTS) for teleprocessing of USSR Gosbank sectorial automated control system data is intended for the organization of long-distance input-output formatted banking documents from the institutions of the bank through communication channels with automated processing of banking information and for the concentration of information flows and their subsequent transmission to the processing centers from oblasts which do not have their own computer centers.

The composition of the hardware includes: Group equipment for the interfacing of the centers (GAS-ts), a concentrator, a terminal for cash operations (T₁) and a terminal for non-cash calculations (T₂).

The programs were written in the Assembler-K language. The interface of the concentrator with the telephone communication channel is secured through a special device (linear adapter), which permits the simultaneous transmission and reception of data between the concentrator and the communication channel through a standard modem in code-independent mode with operating speeds of 600, 1,200, and 2,400 bauds.

Taking into account the fact that the telegraph communication network being used in Gosbank at the present time cannot be instantly replaced with terminals, as well as the fact that in departments of the bank with a small volume of

information--up to 1,000 to 2,000 documents--it is economically inexpedient to utilize group complexes of equipment for the transmission of data, the use of teleprinters is envisaged in the system that has been developed.

Using the concentrator as a remote terminal multiplexer, the computer centers organize the data acquisition through telegraph channels of communication from teleprinters set up in the departments of the bank, with the transmission of data in multiplex mode of communication of every subscriber between the concentrator and the computer processing center through a telephone channel. In this case, data transmission network is built as follows. From the building of the rayon department of the bank to the concentrator, installed, for example, in the city department of the oblast office of Gosbank, a telegraph communication channel is used, and from the concentrator to the processing center, housed in the association [kustovoy] computer center, a telephone communication channel is leased. The utilization of such a two-stepped communication network is called forth by the most economical construction of the data transmission system, on the one hand, and, on the other, the radial structure of the communication network was taken into account.

The connection of the telegraph channels to the concentrator is effected through the interface device. It secures the simultaneous and independent (of the work of the connected terminals) exchange of data through as many as 8 telegraph communication channels. The communication channel is a four-wire channel, which includes a line for reception and a line for transmission (sub-channels). The mode of exchange for every channel is duplex or semi-duplex.

The protection of the information during its transmission through the communication channels is effected through the control of the information blocks being transmitted in accordance with a special polynomial and the control of requisites [rekvizity] of the banking documents being transmitted in accordance with a special key. Through this the necessary level of reliability in information transmission is attained (not more than 1 error per 10^6 characters being transmitted, with a coefficient of errors in the channel for bits not exceeding 10^{-4}).

On the receiving side in the computer center, the installation of a separate modem, securing the conversion of linear to discrete signals, for every channel connected to the system is not required. This function is performed by the group apparatus for signal conversion.

In the group equipment for the interfacing of centers (GAS-ts), intended for the organization of information exchange between computer systems of the processing centers of the Gosbank sectorial automated control system and the terminal equipment of the lower-link institutions, the functional control of the serviceability of the equipment is envisaged as the multiple testing of the data transmission sections, as well as the testing with the use of loops on the level of the linear adapter, the signal conversion device, and others. The testing is accomplished automatically in accordance with program demands or in accordance with signals of the operator console.

The program of the group equipment for the interfacing of the centers [GAS-ts] are built on the base of a system of commands of the concentrator with the use of the same machine-oriented language.

As is apparent from the adduced characteristics, the equipment system for the transmission of data functionally secures the entire technical process of transmission from the moment of the typing of the information on the keyboard of the terminal to its entry directly into the computer, as well as the reverse output of data both for visual perception and documentation (list output) on paper tape.

The direct access of the operators from the terminals to the computer through communication channels and the work of every operator, which is not related to the activity of the others, secure the processing of the information in a real time mode.

The given equipment does not exclude, of course, the use of drum-type telegraph sets of Type T-63 and RTA-80 as terminal devices. For this a special modification of the telegraph concentrator has been developed, which secures the connection to 32 telegraph duplex channels. The given concentrator is installed directly in the computer center when a teletype connection is organized from the bank departments of the oblast center, in which the computer center is housed, and for servicing the departments of the bank of a neighboring oblast, this concentrator may be installed directly on the premises of the office being served by the computer center. In this case, the communication network is organized in the following way: The telegraph communication channels of the bank departments of the office are connected to the concentrator set up in the same office, and the concentrator itself is connected through the allotted telephone voice frequency (TCh) channel, or a physically connected line to the group equipment for the interfacing of centers (GAS-ts) housed in the computer center. The organization of such a connection secures the reduction of the number and length of the telegraph communication channels and is entered into the existing structure of the communication network.

The technical means of teleprocessing of data are built in accordance with the module principle; this secures the possibility of the most advantageous adaptation of the equipment to the conditions of concrete use.

The structure and composition of the technical means of the teleprocessing of data are determined by proceeding from the number of documents being received in the institutions of Gosbank. In the course of one shift, 200 documents can be transmitted from one work station with a T1 terminal, in a shift with a T2 terminal--1,000 documents. From a teletype 800 documents are transmitted per shift.

Institutions with a large volume of documents (city departments and others) are equipped with peripheral hardware (PKTS), the composition of which is supplemented with 1 concentrator, 3 T1 terminals, 5 T2 terminals, 1 input-output perforated tape device, 3 documentation devices, 1 modem, 1 alphanumerical printer, and from 1 to 8 telegraph sets. The exchange of information with such institutions is effected through standard voice frequency channels or physically connected lines.

The first project, where the experimental, and then industrial, operation of the equipment for the teleprocessing of data of a Gosbank sectorial automated control system was begun was the experimental zone on the basis of the multi-use computer center of the Belorussian Republic Office of the USSR Gosbank that has been created.

In this center two complexes of group equipment for the interfacing of centers (GAS-ts) have been installed, which secure the reception and translation of communications of the entire Minsk area, which includes the Minsk city and oblast offices of Gosbank, as well as the Brest and Grodno oblast offices.

For the city department of the Minsk Oblast offices, peripheral hardware was installed in the building of the multi-use computer center, and for the city department of the Minsk city office two peripheral hardware facilities were installed in the building of the Belorussian republic office. The volumes of information processed daily in these offices come to 3,000 to 4,000 and 10,000 to 13,000 documents respectively.

Peripheral hardware has been established in the Molodechno and Borisov departments of Gosbank, as well as in the city departments of the Brest Oblast office, whose information is daily processed by the Minsk Computer Center and amounts to 6,000 to 8,000 documents.

To secure the long-distance processing of information of the departments of the Minsk Oblast office, the necessary number of telegraph concentrators has been installed in the center, through which interactive communication operators of the departments directly with the computer is effected.

In the departments of Gosbank, drum-type telegraph sets have been installed which are connected by telegraph communication channels with the multi-use computer center, which make it possible, along with direct input, to execute reverse data transmission at a telegraph speed of 100 bauds.

By the end of the first six months of 1984, 25 Gosbank institutions were transferred to service by the multi-use computer center of the Belorussian republic office of Gosbank.

The equipment for long-distance data transmission installed in the multi-use computer center and in the Gosbank institutions of the Belorussian office, in the course of its 2-year long operation, has shown that it meets the basic requirements of the automated processing of banking information with respect to accounting and operational work.

The service of the bank institutions of the Brest Oblast office by the Minsk Computer Center indicates that the given equipment secures the long-distance processing of information, which is transmitted by communication channel over a long distance. The transmission and processing of the indicated information can be effected within the assigned time, and they have the necessary degree of reliability.

For the technical maintenance of the concentrators with terminals installed in the Brest Oblast office, a small staff--a total of 3 persons--was required. For comparison, it may be said that 45 persons are engaged in the maintenance of the computer center of the Vitebsk Oblast office, which is equipped with a punchcard calculator system of the Type M-5000 and processes approximately the same volume of information (8,000 to 10,000 documents). (In so doing, of course, share of the maintenance personnel of the Minsk Computer Center is not taken into account).

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ECONOMIC MODELING AND COMPUTER TECHNOLOGY APPLICATION

MONOGRAPH ON MATHEMATICAL METHODS, MODELS REVIEWED

Moscow EKONOMIKA I MATEMATICHESKIYE METODY in Russian No 6, Nov-Dec 84 pp 1151-1153

[Review by B. P. Suvorov of the book "Ekonomiko-matematicheskiye metody i modeli v perspektivnom atlaslevom planirovanii (Voprosy metodologii i metodiki), Novosibirsk, Nauka, 1982, 428 pp]

[Text] The monograph being reviewed generalizes the results of a large cycle of research work by Siberian scientists on the application of mathematical methods in branch planning, which has been conducted intensively in the IE OPP since the beginning of the 1960's. It was preceded by numerous publications which consistently attracted the attention not only of workers in the area of optimization of branch planning, but also practically all people who are interested in questions of the utilization of computer equipment in planning calculations. Along with the well-known work of A. G. Aganbegyan, A. M. Alekseyev, V. V. Kuleshov, D. M. Kazakevich and others, deserved authority has been given to the "Methodological Provisions for Optimal Branch Planning in Industry" (Novosibirsk: Nauka, 1972) and "Basic Methodological Provisions for Optimization of the Development and Distribution of Production" (Moscow, Nauka, 1978), on which the results obtained by the authors of the monograph were also based.

This book shows the progress in the area of theoretical and applied research on problems of applying mathematical instruments in branch planning. Its title reflects only the overall direction of the monograph; the content is essentially broader and embraces questions not only of modeling in long-range branch planning, but also the theory of multilevel systems, multicriterial optimization, the target-program approach, analysis of interbranch interconnections, man-machine interaction, the methodology for the construction of the ASPR and a whole number of other aspects of improvement of planning activity.

Highly typical in this respect is Chapter 1 which gives a general description of the condition and problems of improving models and methods of optimization of branch systems at the present time. Along with the conceptual apparatus that is introduced here with the necessary clarity and concreteness, on the whole the authors have presented the problems of mathematical modeling of economic systems, defined not only by the modern condition of the theory and

practice of calculations on the basis of models, but also by the need for including them in the technology of planning calculations. In particular, they formulate the requirements which are placed on economic and mathematical models in order to provide the necessary quality of the plan that is received on the basis of these. This part of the chapter, along with a discussion of the factor of the indeterminacy in the practice of modeling from a methodological standpoint, is especially attractive.

Chapter 2 presents the principles of the construction and utilization of multilevel systems of modeling. As a synthesizing formation it considers the two-level model of optimization in which on the upper level one constructs a network schedule of branch economic programs, and on the lower level--an optimized model of linear programming. The upper level forms and optimizes the resource-target composition of the branch program, which is concretized by indicators of the dynamics of the output of products in the products list and the allowable level of utilization of limited resources. These assignments are exogenic for the lower level, where the optimization model describes the condition and possibilities of the development of the branch system. It envisions the coordination of models of both levels in terms of the composition of the consumed and transmitted information. In turn, in order to form the internal conditions for the functioning of the branch system, a two-level model is also proposed, which consists of the branch model (upper level) and models of production facilities (lower level). An exchange of information is organized between them: from above to below one transmits indicators of the effectiveness of products, and from below to above--methods of functioning which make it possible to improve the plan for the development of the system according to the accepted criterion.

A model-generator is thus introduced, which is intended for automated formation of information and which contributes to increasing the completeness and reliability of the initial data, to unifying the processes of planning and developing, and to addressing the developed plan to a particular party.

The authors have also investigated certain approaches which realize the designing of multilevel systems through synthesis of two-level models.

In spite of the fact that when considering the multilevel approach they introduce a number of examples related to modeling the development of the petroleum extraction industry, this part of the monograph still suffers from a certain schematism. Moreover, the specific features of the given branch make it necessary to analyze in detail the peculiarities of the specific object, but at the same time this makes it more difficult to understand the fundamental principles of the multilevel approach. Having in mind the methodological direction of the book, it would be expedient, in our opinion, to illustrate the theoretical points and the proposed algorithms by a comparatively simple conventional example as is frequently done, for example, in Chapter 3, which is devoted to multicriterial optimization.

Of special interest here is the elucidation of problems related to the formation and coordination of global and local criteria for optimizing long-range planning (Section 1).

The statement of multitarget problems and a generalized description of the algorithms for solving them are given an excellent presentation which can be recommended as a model of a well-thought-out and structured approach to multicriterial optimization. But the design part of Chapter 3 is essentially not coordinated with the problematic of optimization of the development of branch systems. In particular, practically no attention is paid to the factor of the whole-number nature which is typical of the majority of problems with the selection of plans for construction and reconstruction of enterprises. The necessary methodological recommendations for selecting a method of multicriterial calculations for various cases which the reader might encounter are replaced by a survey, and the selection of the method of indirect limitations is considered more completely and illustrated with an example which is never substantiated.

Chapter 4 is devoted to the development of target-comprehensive programs for the development of branches and branch systems. The authors propose a system of models which is based on stratification of the selected object and the utilization at each level of the models of a type which corresponds to the greatest degree to the needs of the development of the program. The content of this chapter, to a certain degree, amounts to a concretization of the overall approach that is presented previously when describing multilevel systems of models (Chapter 2). It is based on the experience accumulated by the IE OPP in solving applied problems in long-range planning in a number of branches in industry, the development of a multibranch cross-section of regional programs of various types and the optimization of program construction of the complex. The authors have taken the path of generalization of this experience, having made an attempt to describe the procedures for the coordination of calculations for the systems of models with respect to typical situations. But this attempt is not always successful. Thus questions of modeling branch systems are considered using the example of the gas industry, geological prospecting and the petroleum and gas construction industry. The selection of the branch is unsuccessful because of its specific features: suffice it to say that the model of the lower level which is described in detail is based on hydrodynamic calculations. But this is not the main thing: it is more important that here they have not made any attempt to surmount the specific features and move on to the level of generalizations. As a result the integrity of a chapter which occupies one of the key positions in the monograph has suffered.

This shortcoming is made up for to a significant degree in Chapter 5, which gives an overall schema for the optimization of multibranch complexes. The description of the schema is augmented by a system of models of branches of the petrochemical complex (including petroleum extraction, petroleum processing, gas processing and petrochemistry) and the consideration of problems pertaining to an analysis of interbranch and intrabranh ties of the complex of the timber and wood-processing industry. The results of this research which was conducted by the IE OPP has become widely known because of a number of publications which preceded the publication of the book under review. Here they are presented in compact, almost summary form.

An unquestionable success of the collective of authors are Chapters 6 and 7, which contain an economic and mathematical analysis of the solution to

planning problems. The extremely clear-cut presentation, the strict consistency and the use of illustrative examples--all this provides for a combination of weightiness of the material that is presented and its accessibility. In Chapter 6 they characterize the areas of investigation of the effectiveness and stability of solutions to optimization problems and show the possibility of utilizing methods of analysis for coordinating planning decisions in the territorial-branch system using the example of determining an efficient composition and scope for the development of branches of production in the rayons.

Methods of studying the reliability of planning decisions, taking into account the qualitative indicators, are given in a separate chapter. This is an extremely important addition to the analysis of optimization calculations, which are of independent significance. The discussion is about the need to account for the indeterminacy and probability of information about the future development of branch systems, that is, factors which give rise to the need to evaluate the reliability of the plan or, in the definition of the authors, the degree of confidence in carrying out the decisions contained in it. The potential probability of its fulfillment in terms of one indicator or another has been taken as a quantitative measure of the reliability of the plan.

Of special interest are the author's proposals concerning the calculation of functions of elasticity of planning decisions, which reflect the relative degree of achievement of the final goal, depending on the input parameters. Here they set the task not only of analyzing the proposed variant of the plan for its elasticity, but also the construction of a plan with a given elasticity in terms of the basic indicators.

With respect to one of the classes of problems under consideration they suggest a dialogic procedure of optimization which is intended for enlisting experts to evaluate the plan for the development of the branch system, taking into account the qualitative characteristics.

Chapter 8 discusses the results and areas for introduction of economic-statistical models (ESM) in long-range branch planning. The practice of their utilization is analyzed in order to reveal the possibilities of improving the methodology for optimization of complicated branch systems. The first steps in the application of the ESM are related to their role as information models which make it possible to expand the set of initial variants for problems of branch optimization. Subsequently ESM's are included directly in the multilevel systems of optimization where, along with presenting information, they contribute to the process of coordinating planning decisions. The book gives a diagram for the functioning of the models of economic indicators of the operation of the enterprise in the system of models, for optimal territorial and production planning which was developed in the IE OPP.

A considerable amount of attention is devoted to questions of the adequacy of statistical models, which means the correspondence of the results of modeling to the changes and ratios observed in reality. In this connection they analyze such frequently encountered peculiarities of actual economic data as the heterogeneity of the totality of objects investigated, the small volume of selection, the frequent changes in the conditions for the functioning of the

objects, the existence of a priori limitations on activity, and so forth. Therefore they seem to draw a correct conclusion concerning the need to create various ESM's with given properties which reflect the peculiarities of the actual economic processes. A large part of the chapter was devoted to methods of synthesizing these models.

The problems of applying methods of statistical imitation modeling in branch planning which are considered here also touch upon this problematic. These methods make it possible to establish ties between the possible changes in the input variables and the results of the solutions to optimization tasks. These methods make it possible to establish a link between the possible changes in input variables and the results of solutions to optimization problems. Thus one forms an area of probable variation of the optimal decision, which provides additional information for its analysis and adjustment during the process of management. The applicability of the methods of the imitation approach are investigated, in particular, using the example of the utilization of methods of planning the experiment when determining the influence of various factors on the optimal plan on the basis of solving optimization problems related to the development and distribution of ferrous metallurgy in the USSR in the future.

It should be noted that on the whole Chapter 8 presents a number of interesting methodological points (the peculiarities of the improvement of methods for optimization of branch systems, principles of synthesis of hybrid models and so forth). They are studied with respect to the ESM, although they are more universal in nature and could be placed in the part for generalities.

The book is given its monographic finalization by the chapter which is devoted to including economic and mathematical models of branch systems in the technology of planning calculations. The authors have managed to reveal those difficulties which now stand before the organization of branch planning on the basis of modern economic and mathematical instruments. In their discussions they proceed from the need for standardization of the technology for the development of branch plans (with the inclusion in it, in each concrete case, of the specific features of the branch that is being investigated).

The model apparatus is considered as a language for describing formalized planning and economic problems (PEZ) of technological systems of planning. To do this they introduce the concept of "consumer quality" of models, which means their capability of satisfying requirements of the PEZ's that are suggested for implementation. In the final analysis they synthesize a design which has been given the name the model of the technology of planning calculations. The latter integrates the technological aspect of planning, its informational and organizational basis, the adaptive model apparatus, and control over the course of development of plans.

The authors essentially suggest their own approaches to solving the extremely important problem related to increasing the return from the accumulated arsenal of economic-mathematical models and methods of optimizing branch planning. In the modern stage there is an objective need not only for further development of questions of economic-mathematical problems per se; a no less important object of research is the creation of the methodology and methods

for the application of the corresponding methods and electronic computers in planning, and their extensive adaptation to the real conditions for the development of long-range and current plans for the economic and social development of the country. Only then is it possible to expect serious acceleration of the introduction of new instruments into the practice of planning under the conditions of the functioning of the ASPR and OASU. It would be extremely expedient to continue research in this direction.

On the whole one can conclude that the publication of the monograph under review is an important phenomenon which characterizes the modern achievements in the area of the development of instruments for modeling branch plans.

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REGIONAL DEVELOPMENT

KAZAKH SSR ECONOMIC DEVELOPMENT PROBLEMS EXAMINED

Economic Development Analyzed

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 10, Oct 84 pp 102-105

[Article by E. Turkebayev, doctor of economic sciences and director of the Scientific Research Economic Institute for Planning and Normatives under the Kazakh SSR Gosplan. "Problems in the Economic Development of Kazakhstan"]

[Text] The economy of Kazakhstan is an important component of the country's national economic complex. It has achieved much during past five-year plans. There was an increase in the production of industrial and agricultural output, the capital construction industry, transport, and communications developed rapidly, the well-being of the population improved, and its cultural level rose.

Kazakhstan now produces more than 62 billion kilowatt-hours of electric power, 1.321 million tons of mineral fertilizers, and a large quantity of diverse industrial and agricultural production. In 1980, Kazakhstan's nonferrous metallurgy alone produced 49 production descriptions, whereby most of them were released to the market with the State Emblem of Quality. There is also a large volume of production of coal, iron ore, sulfuric acid, and mineral fertilizers. The republic has significant reserves of asbestos, fire-resistant clays and dolomite.

The Kazakh SSR has great possibilities for the production of agricultural output.

The presence in the republic of reserves of mineral raw materials as well as agricultural resources, its favorable territorial position between the country's largest regions including the Center, the Urals and the vast Siberian Zone and the republics of Central Asia, and an increase in the population and labor resources almost double that of the average indicators for the union are all evidence of the favorable conditions for the accelerated development of the productive forces of the Kazakh SSR.

In working out a scheme for the development and distribution of the productive forces of the Kazakh SSR with consideration of the natural economic factors of the republic, ways have been found to solve the most important problems of scientific-technical progress in the republic, to make more effective use of mineral raw materials, to improve the development of the leading production sectors, and to improve the structure of the republic's public production.

An important place among the main questions involved in raising the efficiency of the development of the national economy of Kazakhstan is devoted to the development of the sectors of the fuel and energy complex, especially the coal industry. The Kazakh SSR holds third place in the All-Union mining of coal. The republic has 9 percent of the All-Union reserves of coking coal and almost 20 percent of the power coal.

In the long term, it is expedient to maintain the achieved level of mining of coking coal in the Karaganda Basin, which will make it possible to ensure the reliable provision of the metallurgical industry of Kazakhstan and in part of the Urals as well. The increase in the production of coking coal is mainly being achieved through the complete and efficient modernization of the operating mines and their conversion to a higher level of overall mechanization and automation of labor as well as by raising the enrichment of coal to 100 percent.

The Ekibastuz Coal Basin is developing at a rapid rate. It is located near the industrial regions that are experiencing a fuel shortage.

Calculations show that the increase in the production of power coal in Kazakhstan is not meeting the growing demand for coal. In this connection, the need arises to develop the coal deposits of the Turgayskiy Basin, the closest basin to the Urals, the main coal consumer. It is expedient to begin its development at the Orel Cut. It is also expedient to increase the mining of coal at the Borlinskiy and Sokurskiy deposits, at the Maykyubenskiy Basin, and at other smaller sites.

The development of the coal-mining industry will permit the accelerated formation of the energy base through the assimilation of a series of highly efficient GRES [state regional electric power stations] in a complex with a new GES [hydroelectric power station] under construction in western Kazakhstan (on the Irtysh) and with the Semipalatinsk GES. All of this will ensure a high level of electrification and centralized district heating in Kazakhstan and will permit the simultaneous transmission of electric power to the regions of the country's Center over a unique high-voltage line of direct current at 1,500 kilowatts extending 2,440 kilometers from Ekibastuz to the Center and over the 1500-kilowatt line from Ekibastuz to the Urals as well as others.

In the long term, with the growth of new explored reserves and the application of the newest methods in extraction--methods such as the staged application of hot water as well as the fire method and other means of raising the petroleum yield--it becomes possible to increase the production of oil. Simultaneously in the coming years in western Kazakhstan, it will be expedient to establish a large base in the country for the extraction of casing-head gas and on this basis to develop the output of organic synthesis. The volume of petroleum refined can be increased in the republic through the use of western Siberian oil at the Pavlodar and Chimkent refineries as well as the reconstruction and expansion of the Guryev Refinery and other measures.

In the long term, the mining industry in the republic will grow at a rapid rate. To a considerable degree, this is determined by the formation of a very large phosphorus base in the Karatau Chemical Basin and also by the increase in

the mining of phosphorus raw material in Aktyubinsk Oblast. The ore-mining industry will have to develop new regions for the mining of the ore of ferrous and nonferrous metals in the Uspenskiy Ore Zone and in a number of other regions of the republic.

In speaking of the special features and economic problems involved in the development of the mining sectors of the industry of Kazakhstan, one should dwell on the questions of increasing the overall use of raw materials and the utilization of wastes in ore production. This problem becomes more urgent with the accumulation of unprocessed wastes. By 1 January 1983, their volume in the republic reached almost 11 billion tons, including 9.12 billion tons of rubble, 1.47 billion of products from enrichment processing, 100 million of slag from metallurgical production, 156 million of ash and slag wastes of electric power stations, and 34 million tons of other wastes. In addition, they stored up to 120 million tons of ore not meeting quality requirements, ore that can be used in the future. In 1983, of the entire volume of accumulated wastes in the republic's economy, only 4.3 percent of the rubble, 14.4 percent of enrichment residues and 40 percent of metallurgical slag were used.

If there is not an increase in the utilization of wastes, their volume may more than double in the next 15 to 20 years, and the area that they occupy will exceed 109,000 hectares.

The republic has already accumulated experience in using these wastes. Just through the full utilization of raw materials, the enterprises of nonferrous metallurgy have mastered the production of more than 20 types of new output over the last 10 years. Thus, at the Ust-Kamenogorsk Lead and Zinc Combine imeni Lenin and at the Balkhash Mining and Metallurgical Combine, the value of incidental output reached 50 percent of the value of total output, and it was 30 percent for the sector as a whole.

Calculations show possibilities for a significant increase in the utilization of these wastes, including up to 13.4 percent (by a factor of almost six) for rubble, up to 34 percent, or a factor of almost five, for enrichment residues, and by a factor of more than five for metallurgical slag. For this purpose, it is necessary to construct more than 30 new large-scale processing enterprises and shops, not counting projects of the sectors of union subordination (coal, electric-power, chemical and other industries).

Ekibastuz coals have the lowest production cost of mining in the country (2 rubles, 59 kopecks), and mining costs are one-fifth to one-fourth of the transfer prices, which ensures a large profit every year. It is thought that it would be fully justifiable to allocate an additional part of it to a system of environmental protection work.

There are also significant reserves for further development of Kazakhstan's metallurgical industry. Thus, in the ferrous metallurgy of the republic, it is expedient to bring about the strengthening of the ore base of the metallurgical production of Ural plants and the full provision of the Karaganda Metallurgical Plant with cheap ores from the Lisakovsk Deposit with a significant improvement in the quality of ore preparation.

It is expedient to increase significantly the volume of production of commodity ore at facilities being newly constructed or developed, including the Kachar and Lisakovsk ore-enrichment combines and the Yuzhnyy Sarbay, Kurzhunkul', Kentyube and a number of other deposits. It is proposed to increase the mining of chromite and manganese ores, to expand the production of high-quality refractory materials, etc. The production of iron alloys will be developed.

In examining the further development of the metallurgical complex, one should first of all take a look at ferrous metallurgy. Calculations have established the high effectiveness of the construction of a plant in the region for the production of tubing, of a significantly expanded production of structural metal, and of the construction of a new processing plant for high-grade steel. The necessity of developing tubing production is conditioned not only by the large scale of the output of sheet metal but also and most importantly by the continually growing demand of the national economy of Kazakhstan and the republics of Central Asia for tubing.

Annually in the Kazakh SSR, they are already constructing about 1,000 kilometers of water mains and 1,000 kilometers of their distribution network, hundreds of kilometers of main product lines and their local networks as well as gas and oil pipe lines. In 1980 alone, the overall importation of tubing into the Kazakh SSR reached 1.2 million tons (without considering the growth of at least equal proportions in the demands of the republics of Central Asia). As calculations show, almost 2 million tons of tubing will be needed during the next three or four five-year plans for construction in water management (irrigation and watering of pastures). The average annual cost of transporting this tubing will exceed 10 rubles per ton, according to calculated expenditures. It seems to us that tubing production should be established in the republic itself.

The proposals worked out by GIPROMEZ [State Union Institute for the Planning of Metallurgical Plants] for the development of ferrous metallurgy foresee a reduction in the production of structural steel at the Karaganda Metallurgical Combine, from which the republic now receives up to 500,000 tons of metal a year for construction and repair needs. Consequently, there will again be a sharp increase in the transport of this metal over many thousands of kilometers from the Urals, the Center and the Ukraine against the continually growing reverse exportation of scrap metal.

The republic's metal stocks, requiring continual renewal, have already exceeded 85 million tons. Therefore, the question arises about the construction in the republic of a plant for quality steels. However, this question as well has already been studied for many decades by GIPROMEZ with no final solution having been found.

The republic's nonferrous metallurgy has good possibilities for increasing the production of heavy and especially of light metals, above all aluminum. At the republic's nonferrous metallurgical plants, there is now a broad effort under way to incorporate the latest technology and equipment (underground and compact leaching, oxygen-weighted smelting, smelting in a liquid bath with oxidizing fluming, etc.). At the same time, it is necessary to solve a number

of serious questions. Thus, for example, it is impossible to assent to the calculations of the planning institutes of the USSR Ministry of Nonferrous Metallurgy on limiting the development at a number of enterprises of Kazakhstan's nonferrous metallurgy of fourth reprocessing (production of rolled metal), which is motivated by the presence of unused capacities at other enterprises of the country.

Considerable attention is being paid to accelerating the development of machine building enterprises in the republic. The relative importance of machine building in the sectorial structure of the industry of the Kazakh SSR lags substantially behind the All-Union average level, which has a negative impact on the resolution of questions involving the acceleration of mechanization and automation of labor in many leading sectors of production.

At the present time, measures are being taken to speed up the development of machine building in the Kazakh SSR. During the years of the 10th Five-Year Plan, the rate of growth of machine building output was almost twice that of industrial production. In the years 1961 through 1980, the production has been mastered for about 600 kinds of new machine building output, and 25 kinds began to be produced for the first time in the USSR. Agricultural machine building was developed at an accelerated rate, as a result of which significant successes have been achieved in virgin-land and irrigated farming. The level of overall development of machine building is still insufficient, however. To a large extent, this is explained by the dispersion of enterprises in many subsectors of machine building. It is also necessary to improve the planning by sectorial ministries of the products list with consideration given to meeting the needs of the republic.

At the present time in the republic, there are a few plants whose output is consumed locally. These are the associations Kargormash, which supplies mechanisms for the mine shafts of Karaganda; Vostokmashzavod imeni 50th Anniversary of the USSR, producing self-propelled machinery for nonferrous metallurgy; and the Usselinograd Association for Antierosion Equipment. They all produce output as good as any from foreign countries.

From our point of view, the intensified specialization of the largest machine building plants through the establishment of their branches can provide for a substantial improvement of the situation.

In the complex of questions in the development of the republic's economy, an important place is assigned to the improvement of the agroindustrial complex of Kazakhstan and above all of its material and raw materials base and to a more efficient management of agricultural production. A complex of measures has been worked out providing for stable harvests and the expanded production of feed.

To ensure the production of 1.7 to 1.8 tons of grain per capita and 90-95 kilograms of meat per capita annually, it is essential to provide the republic's agriculture with a stable water supply, especially in its southern regions. The water shortage in the Kazakh SSR is becoming more acute in connection with the increase in the area of plowed lands in virgin-land regions and with the application of farming systems based upon deep tillage and intensive snow retention. In

southern regions, irrigated farming is developing intensively, which limits natural flows of water into small and medium-sized rivers and consequently brings about a fall in the level of large rivers and natural reservoirs. As a result, the ground-water level declines in contiguous regions and the lands become more prone to drought.

Over the last 20 years, for example, the level of the Syr Darya, and accordingly of the Aral Sea as well, fell significantly. Thus, the level of the Aral Sea fell by 9.2 meters. This uncovered a surface area of 2 million hectares, equal to that of such a large reservoir of the republic as Lake Balkhash. There has been a reduction in the volume of water flowing into the Aral Sea by means of the Amu Darya because of an increase in new irrigation blocks in its upstream areas. There is also a worsening of water supply systems of other rivers of interrepublic importance in southern Kazakhstan—the Chu, Talasa and Assy rivers. As a result, many dozens and hundreds of kilometers of surrounding lands are being subjected to drought.

There are plans in the republic for the accelerated formation of the industry of the construction complex and the building materials industry and for the development of transport and communications as well as social institutions and projects in the nonproduction area. For this purpose, it is essential to have more effective specialization and production cooperation, improve the distribution of enterprises, accelerate scientific-technical progress, etc.

In the system of the most important measures to raise the efficiency of the republic's public sector, a special place is occupied by the improvement of transport and economy ties that are largely dependent upon the level of branching of Kazakhstan's transportation network. A number of very important measures are being carried out in this direction in the republic. Work is already being completed in the Kazakh SSR to construct asphalt-surface roads to all central farmsteads of kolkhozes and sovkhoses. A program is being put into effect for the construction of roads to sovkhos departments.

At the same time, there is no unified railroad network in the central regions, which worsens transport and economy ties. Such large developing oblast centers of Kazakhstan as Arkalyk and Dzhezkazgan have no through routes, which complicates their ties with many of the nearest rayons of the republic. This connection is achieved through long circuitous routes, which makes difficult the coordination of interoblast transport and economy ties and the organization of the shortest shipments of many important types of freight between the northeastern and southwestern parts of Kazakhstan. In this connection, complications arise in the reciprocal exchange and delivery of building materials, coal, timber, agricultural output and other national economic shipments.

The resolution of the questions raised in this article will aid in ensuring an increase in the efficiency of public production in the Kazakh SSR as well as in the country's national economy as a whole.

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Equalizing Economic Development Levels

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[Article by N. Kuzenbayev, candidate of economic sciences: "Equalizing the Levels of Economic Development: Methodological and Procedural Bases for Evaluating the Levels of Economic Development of the Intrarepublic Regions"]

[Text] In our country, an equalizing of the levels of economic development of the republics has been carried out. The decree of the CPSU Central Committee "On the 60th Anniversary of the Great October Socialist Revolution" states that "in the years of Soviet authority, there has been an equalization of the level of economic development of all Soviet republics." Now the task objectively arises of equalizing the levels of economic development of intrarepublic regions. It has become essential to do more in each region to utilize natural wealth and conditions as well as manpower resources, seeking to advance the economic system and to increase the production of output, especially in rayons that are lagging behind in economic development.

It is known that the level of economic development of a region depends upon the totality of factors and conditions. The most important of them are: rational distribution of productive forces, extent of utilization of the production potential, assimilation of natural resources, natural conditions, manpower resources, and the overall development of the economy.

Along with the rapid growth of the republic's economy, one observes differences in the development levels of the oblasts. The question arises: Is it possible to eliminate them completely? In this regard, F. Engels wrote: "There will always be a certain inequality in the living conditions between individual countries, regions and even localities. It will be possible to reduce the inequality to a minimum but it will never be possible to eliminate it entirely."¹ The task is to bring their levels closer together, eliminating the important differences between them.

Before resolving this task, it is essential, in our view, to evaluate the levels of economic development of the regions. The well-known economist Sh. L. Rosenfeld writes: "The main task in evaluating the levels of development of the economy in the rayons involves providing planning with materials of a specifically rayon nature and indicating to what extent the peculiarities of today's conditions influence the development of productive forces and what is necessary to equalize the levels of economic development of the regions."²

What should be the territorial limits of this evaluation and what indicators should be used? It seems to us that one must proceed from the Leninist methodology of the grouping of rayons according to similar characteristics, which is the basis for the formation of a system of rayon national economic complexes--intrarepublic regions. We note that under the level of economic development of an intrarepublic region we understand a certain stage of the development of its productive forces achieved on the basis of contemporary scientific-technical progress and the efficient utilization of natural wealth, manpower resources and natural conditions to satisfy the material and cultural demands of its population under the continuous increase in its contribution to the unified national economic complex of the country.

Now about the indicators for the evaluation of the levels of their development. As is known, the levels of the economic development of the union republics are

determined in accordance with the per-capita national income of the population or the national income per able-bodied worker. This indicator, however, is not suitable for low-level territorial units, for which the volumes of national income are not calculated. Obviously, it is necessary to employ a system of indicators. In this connection, one should take indicators that can be subjected to quantitative measurement and analysis. Among them we include (per capita of population):

- production of industrial output,
- productive industrial fixed capital,
- number of workers in industry per 1,000 population,
- electric power production,
- production capital investments in industry,
- gross agricultural output,
- power capacities in agriculture.

These indicators (determining conditions) are interrelated. In the first place, industry and agriculture, as decisive sectors of physical production, are interconnected through reciprocal deliveries of output, supplying the entire reproductive process in the society. In the second place, productive, industrial fixed capital and the output of electric power and power capacity in agriculture are the main factors in the production of both industrial as well as agricultural output. Thirdly, the volume of productive industrial fixed capital, the production of electric power, the number of workers per 1,000 population, and capital investment in industry represent decisive indicators of the industrial development of regions and the basis for the utilization of the achievements of scientific-technical progress, for increasing the economic potential, and for improving the conditions of production, labor and the everyday life of the population. They also express the basic principle of K. Marx: "Economic epochs are distinguished not by what is produced but by how it is produced, through what means of labor." Consequently, in evaluating the levels of economic development of intrarepublic regions, it is not enough to have an idea of the overall volumes of output. It is also essential to be familiar with the technical basis of production.

In selecting these indicators, consideration was given above all to the connection of each element of the system with the output of the two main sectors of physical production--industry and agriculture. Consideration was then given to the necessity of simplifying the system, of reducing it to a smaller number of indicators, so that there was the possibility of determining their quantitative influence on one another and of controlling and analyzing the entire system of indicators. Some indicators, in particular the satisfaction of the physical and cultural demands of the population, the return on investment, and others, were not included among the elements of the proposed system as derived from the volume of production output and from the efficient use of fixed production capital.

Let us examine the correlations between the adopted indicators. To determine the closeness of the connection, coefficients of paired correlation have been calculated according to the following formula:

$$r_{Y_K X_m} = \frac{\sum_{i=1}^n (Y_{Ki} - \bar{Y}_K) (X_{mi} - \bar{X}_m)}{\sqrt{\sum_{i=1}^n (Y_{Ki} - \bar{Y}_K)^2 \sum_{i=1}^n (X_{mi} - \bar{X}_m)^2}}$$

where Y_K is the indicator of the production of industrial output if $K = 1$, and the indicator of agricultural output if $K = 2$;

X_m is the indicator of the determining conditions;

\bar{Y}_K, \bar{X}_m are the average values of the indicators;

m is 1, 2, 3 or 4 if $K = 1$;

m is 5 if $K = 2$;

i is 1, 2, 3...10, numbers of observations (territorial units).

We are examining the correlations for 10 regional national economic complexes. Indexes of the indicators of economic development (the relation of the individual indicators of the regions per capita relative to the republic average) serve as the basis for the calculations. They are shown in Table 1. In this table, coefficients of paired correlation are calculated between the indexes of industrial output per capita of population (Y_i) and other determining conditions:

--fixed production capital X_1 ;

--the number of workers in industry per 1,000 people in the population X_2 ;

--electric power production X_3 ;

--production capital investment X_4 .

In agriculture, the coefficient of correlation has been calculated between the indexes of gross production Y_i and power capacities X_5 .

Calculations have shown that the coefficient of correlation between indexes of production of industrial and agricultural output per capita and other determining conditions are correspondingly:

$$\begin{aligned} r_1 &= 0.68 \\ r_2 &= 0.81 \\ r_3 &= 0.77 \\ r_4 &= 0.18 \\ r_5 &= 0.89 \end{aligned}$$

As we see, the interrelationship between capital investments in industry and output is weak ($r_4 = 0.18$). This is explained by the fact that capital investments have no direct connection with the production of output. The latter is mediated through the active part of industrial capital, in which its relative share does not exceed 30 percent. For the other positions, the correlations are rather high.

The data presented indicate the correctness of the choice of a system of indicators characterizing the overall extent of economic development of different regions of Kazakhstan. With such heterogeneity, however, it is difficult to evaluate the levels under review. They must be brought under one aggregate. As no system of methods has been worked out here, we will examine several methods approximately analogous to the methods of the grouping of grades and sections according to yield that were once used by the academician V.S. Nemchinov and which would make it possible to evaluate the levels of economic development of the regions by means of their grouping.

We have expressed the diverse economic indicators of the regions in the form of indexes (the relations of the individual indicators of the regions to their republic-average indicators). We designate the individual indicators of economic development through $y_1, y_2, x_1, x_2, \dots, x_n$. Consequently, the conditions for the inclusion of diverse indicators in one aggregate are: the conversion of magnitudes of different denominations into relative magnitudes; and the evaluation of the position of the regions for each individual indicator, that is, the inclusion in a group or the determination of the position occupied in the system of regions.

In this connection, one of the simplest methods of including diverse indicators of the economic development of regional national economic complexes -- intra-republic regions in one whole is the incidence of their indicators in one group or another. For this purpose, use is made of the indexes of the indicators for the regions. On their basis, it is possible to group the regions according to the level of economic development.

As we see from Table 1, according to the index of per-capita production of industrial output, Pavlodar, Karaganda-Dzhezkazgan, Vostochno-Kazakhstan and Semipalatinsk regional complexes are included in the highest group of economic development under the conditions of Kazakhstan (with an index above the republic's average indicator); the group with a medium level of development (with an index no lower than 0.75 of the republic's average indicator) included Kustanay-Turgay, Alma-Ata-Taldy-Kurgan, Severo-Kazakhstan and Yuzhno-Kazakhstan regional complexes; and the lowest group (with an index under 0.75 of the republic average) included Aktyubinsk-Ural and Gur'yev-Mangyshlak regional complexes. The composition of the groups varies depending upon the incidence of the indicators of regional complexes in one group or another.

The first group according to gross agricultural output includes Aktyubinsk-Ural, Kustanay-Turgay, Pavlodar, Severo-Kazakhstan and Semipalatinsk regional national economic complexes. The second group includes the Alma-Ata-Taldy-Kurgan, Vostochno-Kazakhstan and Yuzhno-Kazakhstan complexes, and the third group includes the Gur'yev-Mangyshlak and Karaganda-Dzhezkazgan complexes.

The structuring of the regions according to groups also varies depending upon the incidence of their indicators by levels of economic development. Whereas for the index of per-capita industrial output, four regional complexes belong to the first group, four to the second and two to the third, for the index of productive industrial fixed capital there are five regional complexes in the first group and five of them in the third group. Their composition also changes sharply

for the remaining determining conditions. On the basis of the data on the incidence of indicators in different groups of levels, it is possible to distribute regional complexes to the following groups:

Vostochno-Kazakhstan, Karaganda-Dzhezkazgan, Kustanay-Turgay and Pavlodar regional complexes belong to the first (highest) group of economic development. The second group includes Severo-Kazakhstan and Semipalatinsk complexes, and the third group includes the Aktyubinsk-Ural, Alma-Ata-Taldy-Kurgan, Gur'yev-Mangyshlak and Yuzhno-Kazakhstan complexes.

Table 1. Indexes of Indicators of the Economic Development of National Economic Complexes Per Capita

Районные народно-хозяйственные комплексы (1)	y_1	x_1	x_2	x_3	x_4	y_2	x_5
Казахской ССР (2)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Актыубинско-Уральский (3)	0.63	0.61	0.84	0.18	0.54	1.10	1.38
Алма-Атинско-Талды-Курганский (4)	0.84	0.49	0.91	0.32	0.40	0.77	0.55
Восточно-Казахстанский (5)	1.42	1.52	1.39	1.54	1.28	0.91	0.74
Гурьевско-Мангышлакский (6)	0.73	1.68	1.67	1.67	3.70	0.38	0.30
Карагандинско-Джезказганский (7)	1.55	2.22	1.67	1.82	1.66	0.50	0.53
Кустанайско-Тургайский (8)	0.97	1.12	1.02	0.10	0.87	1.83	2.29
Павлодарский (9)	1.93	1.98	1.33	6.28	2.23	1.09	1.21
Северо-Казахстанский (10)	0.78	0.63	0.95	0.45	0.49	1.70	1.85
Семипалатинский (11)	1.21	0.48	0.86	0.02	0.42	1.02	1.05
Южно-Казахстанский (12)	0.77	0.69	0.69	0.56	0.85	0.76	0.57

Key:

- | | |
|---|--------------------------|
| 1. Regional National Economic Complexes | 7. Karaganda-Dzhezkazgan |
| 2. Kazakh SSR | 8. Kustanay-Turgay |
| 3. Aktyubinsk-Ural | 9. Pavlodar |
| 4. Alma-Ata-Taldy-Kurgan | 10. Severo-Kazakhstan |
| 5. Vostochno-Kazakhstan | 11. Semipalatinsk |
| 6. Gur'yev-Mangyshlak | 12. Yuzhno-Kazakhstan |

Calculated using statistical data of the Kazakh SSR TsSU [Central Statistical Administration] by oblasts for 1980

Gross agricultural production for 1976-1980 computed using annual averages according to the statistical yearbook "Narodnoye khozyaystvo Kazakhstana v 1980 g." [National Economy of Kazakhstan in 1980], Alma-Ata, 1981, p 72.

Agricultural energy capacities of the Kazakh SSR in accordance with the statistical reference book "Energeticheskiye moshchnosti sel'skogo khozyaystva na 1 yanvarya 1981 goda" [Agricultural Power Capacities on 1 January 1981], Alma-Ata, 1981, p 8.

In grouping the regions in accordance with the incidence of indicators, it is possible that its results were to some degree influenced by the visual evaluation. In this connection, for greater objectivity, let us examine the evaluation method using averaged points. That is, we will determine the positions occupied by the regions in accordance with the individual indicators of economic development. The less developed they are economically, the more points they will accumulate and vice versa.

Whereas the Pavlodar regional complex occupies first place in the index of industrial output per capita, second place in productive industrial fixed capital and fourth place in a agricultural output, the Aktyubinsk-Ural complex occupies 10th, eighth and third places in these indicators, respectively, and the Alma-Ata-Taldy-Kurgan complex occupies sixth, ninth and seventh places, respectively. Their averaging was done by summing the number of points (S) and relating them to the number of indicators (n) for each region (Table 2).

In seven economic indicators, the Aktyubinsk-Ural regional complex received an average of 6.71 points among the regions for the level of economic development. Alma-Ata-Taldy-Kurgan received 7.57 points, Pavlodar 2.43, and Karaganda-Dzhezkazgan 3.86 points. Now they must be grouped according to the level of economic development. For this purpose, the averaged points attained are distributed by groups with an interval from 2.1 to 4, from 4.1 to 6, and from 6.1 to 8. Indisputably, these intervals were dictated by the relatively narrow ranges of variation of the averaged points. In distributing them according to the indicated intervals, three groups were obtained, which was essential to break the regions down into higher, medium and lower levels of economic development. For this purpose, the consideration is that the closer the points are to one, the higher is the level of economic development and conversely. In accordance with the indicated intervals, the Karaganda-Dzhezkazgan and Pavlodar regional complexes belong to the first group, the Vostochno-Kazakhstan, Kustanay-Turgay and Severo-Kazakhstan complexes to the second group, and the third group includes the Aktyubinsk-Ural, Alma-Ata-Taldy-Kurgan, Gur'yev-Mangyshlak, Semipalatinsk and Yuzhno-Kazakhstan regional complexes.

The results of the grouping of regional complexes according to the method of incidence of indicators in the groups of levels differs from grouping according to averaged points in that the first group takes in four regional complexes in the first case, whereas it includes two regional complexes in the second case. The second group includes two regional complexes in the first case and three regional complexes in the second case, and the third group includes four and five regional complexes, respectively.

The third method of evaluating levels of economic development involves determining the share of the points in their totality. For this purpose, the points were totaled for each regional complex ($\sum S$). The points were then summed vertically, that is, for all 10 regional complexes (P). The sums of the quantities S, coinciding with the sums of the quantities P, form the totality of points Q, that is $\sum P = \sum S = Q$. The relation of the sum of points for each region to their totality ($\frac{S}{Q} \times 100$) determines its share in the latter (Table 3). This is the aggregated-index method.

It is clear from the table that the magnitudes of the shares of the points in the totality ranges from 4.42 to 13.77. Considering this, they were broken down into equal intervals of from 4.1 to 7, from 7.1 to 10, and over 10.1. It is the nature of the addends that the higher the relative weight of a region in the totality of points, the lower is the level of its economic development and vice versa. Proceeding from this principle, the first group includes Karaganda-Dzhezkazgan and Pavlodar, the second group Vostochno-Kazakhstan, Kustanay-Turgay and Severo-Kazakhstan, and the third group includes

Table 2. Evaluation of the Levels of Economic Development of Regional National Economic Complexes According to Averaged Points for 1980

	Занимаемые места по показателям экономического развития (баллы — S)										(2) Сумма баллов (ΣS)	(3) Усредненные баллы ($\frac{S}{n}$)	Интервалы для группировки			(8) Группы
	У ₁	Х ₁	Х ₂	Х ₃	Х ₄	У ₂	Х ₅	Х ₆	У ₃	Х ₇			от 2,1 до 4	от 4,1 до 6	от 6,1 до 8	
1. Актобинско-Уральский (9)	10	8	8	8	8	7	3	3	3	3	47	6,71			6,71	III
2. Алма-Атинско-Талды-Курганский (10)	6	9	6	7	10	7	8	10	7	8	53	7,57			7,57	III
3. Восточно-Казахстанский (11)	3	4	2	4	4	4	6	6	6	6	29	4,14		4,14		II
4. Гурьевско-Мангышлакский (12)	9	3	10	3	1	10	10	1	10	10	46	6,57			6,57	III
5. Карагандинско-Джезказганский (13)	2	1	1	2	3	9	9	3	9	9	27	3,86	3,86			I
6. Кустанайско-Тургайский (14)	5	5	4	9	5	1	1	5	1	1	30	4,29	4,29			II
7. Павлодарский (15)	1	2	3	1	2	4	4	2	4	4	17	2,43	2,43			I
8. Северо-Казахстанский (16)	7	7	5	6	8	2	2	8	2	2	37	5,28		5,28		II
9. Семипалатинский (17)	4	10	7	10	9	5	5	9	5	5	50	7,14			7,14	III
10. Южно-Казахстанский (18)	8	6	9	5	6	8	8	6	8	7	49	7,0			7,0	III

Key:

1. Positions occupied in indicators of economic development (points-S)
2. Sum of points
3. Averaged points
4. Grouping intervals
5. From 2.1 to 4
6. From 4.1 to 6
7. From 6.1 to 8
8. Groups
9. Aktyubinsk-Ural
10. Alma-Ata-Taldy-Kurgan
11. Vostochno-Kazakhstan
12. Gur'yev-Mangyshlak
13. Karaganda-Dzhezkazgan
14. Kustanay-Turgay
15. Pavlodar
16. Severo-Kazakhstan
17. Semipalatinsk
18. Yuzhno-Kazakhstan

Table 3. Evaluation of the Levels of Economic Development of Regional National Economic Complexes According to Shares of Points in Their Totality

	Занимаемые места по экономическим показателям (баллы — S) (1)										ΣS	Доля в совокупности $\frac{\Sigma S}{Q} \cdot 100$ (2)	Интервалы для группировки			Группы (7)
	Y ₁	X ₁	X ₂	X ₃	X ₄	X ₅	Y ₂	X ₆	X ₇	X ₈			от 4.1 (4) до 7	от 7.1 (5) до 10.1	от 10.1 (6) до 13.1	
Актыбинско-Уральский (8)	10	8	8	8	8	7	3	3	3	3	47	12.21			12.21	III
Алма-Атинско-Талды-Курганский (9)	5	9	6	7	10	7	8	7	8	8	53	13.77			13.77	III
Восточно-Казахстанский (10)	3	4	2	4	4	4	6	6	6	6	29	7.53	7.53			II
Гурьевско-Мангышлакский (11)	9	3	10	3	1	10	10	10	10	10	46	11.94			11.94	III
Жаргандинско-Джезказганский (12)	2	1	1	2	3	9	9	9	9	9	27	7.01	7.01			I
Кустанайско-Тургайский (13)	5	5	4	9	5	1	1	1	1	1	30	7.79		7.79		II
Павлодарский (14)	1	2	3	1	2	4	4	4	4	4	17	4.42	4.42			I
Северо-Казахстанский (15)	7	7	5	6	8	2	2	2	2	2	37	9.61		9.61		II
Семипалатинский (16)	4	10	7	10	9	5	5	5	5	5	50	12.99			12.99	III
Южно-Казахстанский (17)	8	6	9	5	6	8	8	8	8	8	49	12.73			12.73	III
Сумма P (18)	55	55	55	55	55	55	55	55	55	55	385 (Q)					

Key:

- Positions occupied in economic indicators (points-S)
- Share in the totality
- Grouping intervals
- From 4.1 to 7
- From 7.1 to 10
- Over 10.1
- Groups
- Aktyubinsk-Ural
- Alma-Ata-Taldy-Kurgan
- Vostochno-Kazakhstan
- Gur'yev-Mangyshlak
- Karaganda-Dzhezkazgan
- Kustanay-Turgay
- Pavlodar
- Severo-Kazakhstan
- Semipalatinsk
- Yuzhno-Kazakhstan
- Sum

Aktyubinsk-Ural , Alma-Ata-Taldy-Kurgan, Gur'yev-Mangyshlak, Semipalatinsk, and Yuzhno-Kazakhstan.

The results of the evaluation of the levels of economic development of the regional complexes coincide for the method of averaged points and for the computation of the share of the points in their totality. Therefore, these methods are suitable for including diverse indicators in one totality. Thus, the use of the system of indicators represents a real approach to evaluating the levels of economic development of intrarepublic regions.

The cited grouping of regional complexes, as a form of manifesting the evaluation of the levels of their economic development, reflects the actual situation that has developed in the current stage. It doubtless will change as the economic structures are improved.

Mention was made above of the close correlations between the production of industrial output and other indicators of the economic development of regions as well as between agricultural output and power capacities in agriculture. The data of Table 1 also give evidence of the relationships between indexes for production output and other determining conditions. Let us take the Aktyubinsk-Ural regional complex. Here, with an index of productive industrial fixed capital amounts to 0.61, the index of agricultural output is 1.10, and the index of power capacities in agriculture is 1.38. In the Severo-Kazakhstan regional complex, the index of per-capita production of industrial output of 0.78 corresponds to the index of productive industrial fixed capital of 0.63, and the index of gross agricultural output of 1.70 corresponds to the index of power capacities of 1.85. Consequently, the indicators shown are interrelated and reflect the general trend in each region and certain natural paths.

The proposed system of indicators of the methodological and procedural bases for evaluating the level of economic development of intrarepublic regions, in characterizing different aspects of the economic life of the regions, represents a more realistic yardstick. On this basis, diverse indicators are included in one totality through grouping them. Three groups of regional complexes have been distinguished for the levels of economic development. Two complexes have been included in the highest group under the conditions of Kazakhstan, three in the middle group and five in the lowest group. Such a grouping is the basis for examining the task of eliminating the essential differences between them in the process of planning the economic and social development of the republic.

FOOTNOTES

1. K. Marx and F. Engels, "Sochineniya" [Works], Vol 34, p 104.
2. Sh. L. Rosenfeld, "Metodologiya vyravnivaniya urovney razvitiya ekonomicheskikh regionov SSSR" [Methodology of Equalizing Levels of Development of Economic Regions of the USSR], Moscow, 1969, p 5.
3. Marx and Engels, op. cit., Vol 23, p 191.

4. V.S. Nemchinov, "Izbrannyye proizvedeniya" [Selected Works], Vol 2, Moscow, "Nauka," 1967.

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REGIONAL DEVELOPMENT

ESTONIAN PRODUCTION EFFICIENCY INDICATORS DETAILED

Moscow VESTNIK STATISTIKI in Russian No 12, Dec 84 pp 21-28

[Article by V. Vokk, deputy chief of the Estonian SSR Central Statistical Administration, candidate of economic sciences, and S. Ippolitov, acting laboratory chief of the Scientific Research Institute of the USSR Central Statistical Administration, candidate of economic sciences: "Deepening Analysis of the Economic Effectiveness of Public Production in the Republic"]

[Text] In order to evaluate and analyze the economic effectiveness of the republic's public production, the Estonian SSR Central Statistical Administration utilizes a number of indicators. They include indicators of labor productivity, material-intensiveness of the output, output-capital ratio, turnover of material circulating capital, expenditures per ruble of output, profitability of the output and production capital, the effectiveness of capital investments and several others.

At the national economic level the economic effectiveness of public production is studied in terms of indicators of the productivity of public labor, the material-intensiveness of the product, and the output-capital ratio.

During 1971-1982 the main indicators of the economic effectiveness of public production changed in the following way.

Table 1--Basic Indicators of Economic Effectiveness of Public Production of Estonian SSR* (in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Growth rates:				
of productivity of public labor	129.1	153.4	156.0	164.2
of material-intensiveness of products (not including amortization)	98.4	97.3	96.2	93.0
of output-capital ratio	89.0	82.4	79.4	79.8

* The indicators were calculated in the following way: the productivity of public labor--the ratio between the national income in comparable prices and the average annual number of workers in the sphere of production; material-intensiveness of products--the ratio between material expenditures in comparable prices and the gross social product in comparable prices; output-

capital ratio--the ratio between the national income in comparable prices and the average annual value of fixed production capital.

From the figures in the table it is clear that the indicators of the productivity of public labor and the material-intensiveness of the products had a positive dynamic while the indicator of the output-capital ratio had a negative one. Of course, the indicator of the output-capital ratio can also have a positive tendency. In particular, in 1982 the utilization of the fixed production capital of the republic improved somewhat as compared to 1981.

From the main indicators of the economic effectiveness of public production one cannot judge: whether the economy of the republic developed effectively or ineffectively even with a positive dynamic of all indicators. The primary reason is that they are not a system: they do not include a main (integral) indicator and particular ones. Moreover, they are not intercoordinated in terms of economic content or dimensions. This has also predetermined the need to search for new approaches to the evaluation of the economic effectiveness of public production.

A quantitative evaluation of any phenomenon, including such a complicated one as the economic effectiveness of public production, can, in our opinion, be produced only if there is in the system of the main (integral) indicator also a hierarchy of particular indicators which are developed from the main indicator and characterize its structure. All indicators--main and particular--must be intercoordinated in terms of the economic content and dimensions.

In 1983 the Estonian SSR Central Statistical Administration, in order to produce a quantitative evaluation of the economic effectiveness of public production, tested a system of indicators which was constructed on the basis of the following methodological principles.

It is known that as a result of the interaction of the labor force and the means of production one obtains a product in which is embodied newly combined (live) labor and that which is transferred from the consumed means of production (embodied). The less socially necessary labor that is expended on the production of products, the lower its cost. Hence it follows: the economic effectiveness of public production is characterized by the amount of labor expenditures that are socially necessary for the production of a unit of output, that is, the cost. Consequently, the main (integral) indicator of the economic effectiveness of public production characterizes the quantity of products per unit of expenditure of socially necessary labor (per unit of cost) or the amount of expenditures of socially necessary labor (cost) per unit of output. Particular indicators of the economic effectiveness of public production characterize the quantity of products per unit of expenditure of live labor (newly created value) or embodied labor (transferred value) and also the amount of expenditures of live labor (newly created value) or embodied labor (transferred value) per unit of output.

On the basis of what has been presented above, the system of indicators of the economic effectiveness of public production can be presented in the following form: the effectiveness of expenditures of all (live and embodied) labor; the

effectiveness of labor expenditures that form the production cost (necessary plus past, embodied labor) of products; the effectiveness of expenditures of necessary labor; the effectiveness of expenditures of added labor; the effectiveness of expenditures of embodied labor; the effectiveness of expenditures of labor embodied in consumed implements of labor (raw material, basic and auxiliary materials, fuel and so forth); the effectiveness of expenditures of labor embodied in consumed means of labor (fixed production capital).

In the system that is presented the indicator of the effectiveness of expenditures of all (live and embodied) labor is the main (integral) indicator, and all the others are particular indicators of the effectiveness of public production.

In order to calculate the indicators of the economic effectiveness of public production in practice it is possible to utilize indicators of the expenditures of total labor on the production of products or prices, which are forms of manifestation of socially necessary expenditures of labor (value).

Let us consider first the methodology for calculating the main and particular indicators of the economic effectiveness of public production per physical (labor) unit of expenditures.

It is known that the indicators of the expenditures of total labor on the production of a unit of output (indicators of complete labor-intensiveness) can be calculated from data of interbranch balances of the production and distribution of the social product. But it is also possible to use another, simpler method of calculating the indicators of expenditures of total labor per unit of output.

In the process of labor, as we know, one creates a product in which is accumulated human labor which forms its value, and which is composed of the following elements: c (embodied labor), v (necessary labor), and m (added labor). As K. Marx noted, each of these elements can be expressed in proportions of the product.¹

Let us designate the entire volume of produced output by the symbol Q , the volumes of output reflecting the elements of value c , v , m --by the symbols q_c , q_v , q_m , and the value of the entire volume of output--by the symbol P . Then

$$\frac{P}{Q} = \frac{c + v + m}{q_c + q_v + q_m}$$

Since the volume of each part of the product is proportional to the corresponding part of the value, $q_c = Q/P \times c$, $q_v = Q/P \times v$, $q_m = Q/P \times m$, or

$$\frac{P}{Q} = \frac{c}{q_c} = \frac{v}{q_v} = \frac{m}{q_m}$$

Having substituted the amount P, c, v, and m with the indicators tau, t_c , t_v , t_m , which characterize expenditures of total, embodied, necessary and added labor, the equation written above assumes the form:

$$\frac{\tau}{Q} = \frac{t_c}{q_c} = \frac{t_v}{q_v} = \frac{t_m}{q_m}$$

Hence it follows: the labor which created one or another element of the value characterizes the expenditures of the total (live and embodied) labor of the production of products, which reflects the given element of the value. Consequently, if one knows the labor expenditures which created any particular element of the value and the amount of the value created by it, and also the volume of products produced and the amount of their value, the expenditures of total labor or the production of a unit of output can be calculated by using the following formulas:

$$\tau = (t_i \cdot P/p_i) : Q, \quad (1)$$

$$\tau = (t_i \cdot Q/q_i) : Q, \quad (2)$$

$$\tau = t_i/q_i \quad (3)$$

where τ -- expenditures of total labor per unit of output;

t_i -- expenditures of labor which created i element of value;

P -- amount of value of entire product;

p_i -- amount of i element of value;

Q -- value of product;

q_i -- volume of product reflecting i element of value.

When Q is divided by $(t_i \cdot P/p_i)$ and by $(t_i \cdot Q/q_i)$, and q_i --by t_i , we obtain indicators of the effectiveness of expenditures of the total labor (W). If instead of q_i we substitute $(q_v + q_m)$, and instead of t_i -- $(t_v + t_m)$, then $(q_v + q_m):(t_v + t_m)$ characterizes the productivity of public labor. It is calculated by the ratio of the national income (ND) in comparable prices and the average annual number of workers (T) in the sphere of material production, which approximately characterizes labor expenditures which created the new value. Consequently, the indicator of the productivity of public labor is the main, integral indicator of the economic effectiveness of public production.

For analytical purposes it is important to know not only the effectiveness of expenditures of total labor, but also the effectiveness of expenditures of live and embodied labor. Therefore, in addition to the main indicator, in the system we have also singled out particular indicators which can be calculated by using the following method.

The effectiveness of labor expenditures that form the production cost of the products is calculated according to the formula:

$$W_c = ND:(T \frac{MZ + MD_1}{VP}),$$

where W_c -- the effectiveness of labor expenditures that form the production cost of the product;
 ND -- the volume of national income in comparable prices;
 T -- expenditures of total labor on the production of the national income in comparable prices (they are equal to expenditures of live labor for the entire volume of output);
 MZ -- material expenditures (including amortization) in comparable prices;
 ND_1 -- the amount of national income in comparable prices utilized for private consumption is determined as the product of the national income in comparable prices and the proportion of wages of workers in the sphere of material production (fund of calculated wages; bonuses not included in the wage fund; business expenses; payments for organized recruitment of labor force; wages on kolkhozes in monetary and physical form; incomes from private subsidiary farms) in the national income in current prices;
 VP -- the volume of the gross social product in comparable prices.

The effectiveness of expenditures of live labor (W_{zh}) is determined according to the formula:

$$W_{zh} = ND:(T ND/VP). \quad (5)^2$$

The effectiveness of expenditures of necessary labor (W_n):

$$W_n = ND:(T ND_1/VP), \quad (6)$$

where ND_1 --national income in comparable prices for consumption.

The effectiveness of expenditures of added labor (W_p):

$$W_p = ND:(T ND_2/VP), \quad (7)$$

where ND_2 --national income in comparable prices for accumulation and other expenditures ($ND_2 = ND - ND_1$).

The effectiveness of expenditures of embodied labor (W_o):

$$W_o = ND:(T MZ/VP). \quad (8)$$

The effectiveness of expenditures of labor embodied in consumed objects of labor (W_{op}):

$$W_{op} = ND:(T MZ_1/VP), \quad (9)$$

where MZ_1 --material expenditures (not including amortization in comparable prices).

The effectiveness of labor expenditures embodied in consumed means of labor (W_{oc}):

$$W_{oc} = ND:(T MZ_2/VP), \quad (10)$$

where MZ_2 --amortization deductions in comparable prices.

The indicators of the economic effectiveness of public production were calculated by the method presented above (see Table 2).

Table 2--Growth Rates of Economic Effectiveness of Public Production of Estonian SSR* (in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Growth rates:				
Effectiveness of total (live and embodied) labor expenditures	129.1	153.4	156.0	164.2
Effectiveness of labor expenditures that form production cost	129.9	153.6	156.5	165.7
Effectiveness of expenditures of live labor	131.5	156.0	158.0	161.3
Effectiveness of expenditures of necessary labor	136.9	159.5	162.5	163.9
Effectiveness of expenditures of added labor	125.8	152.0	153.4	158.4
Effectiveness of expenditures of public labor	127.5	151.7	154.5	167.9
Effectiveness of expenditures of labor embodied in consumed objects of labor	131.2	157.7	162.0	177.7
Effectiveness of expenditures of labor embodied in consumed implements of labor	99.3	108.9	105.0	107.3

* Here and henceforth indicators are calculated on the basis of existing reports.

From the figures in Table 2 it is clear that in the period of time that was analyzed the growth of economic effectiveness of public production was provided in the republic as a result of reducing expenditures of live and embodied labor, including expenditures of labor embodied in consumed means of labor. It is typical that the effectiveness of expenditures of labor embodied in consumed means of labor increased in the republic while there was a reduction of the output-capital ratio by more than 20 points. The contradictoriness of the indicators is conditioned by a number of circumstances. One of them is the lack of correspondence between the prices and the value of fixed production capital. Additionally, it is incorrect, in our opinion, to determine the effectiveness of the utilization of fixed production capital only from the indicator of the output-capital ratio, which

reflects the change in the amount of funds used for producing a unit of output in physical-substantial form and does not take into account changes in labor expenditures on reproducing them. Still, in the analysis of the utilization of fixed production capital it is important to take into account the change in labor expenditures which is carried over to the product from the means of labor both as a result of the change in labor expenditures on their reproduction and as a result of the change in the amount of applied fixed production capital in the production of a unit of output. This is necessary because their physical wear and tear is not equal to their deterioration in value. Therefore the large amount of applied fixed production capital in the production of a unit of output can be covered by the reduction of expenditures of total labor on their reproduction in branches that produce fixed capital. Similarly, it is necessary to analyze the indicators of the material-intensiveness of the product.

Economizing on labor expenditures for all elements of production provided for a corresponding increase in the effectiveness of expenditures of total labor, which is clear from the figures in Table 3.

Table 3--Proportion of Growth of Economic Effectiveness of Public Production of Estonian SSR Resulting From Reduction of Expenditures of Live and Embodied Labor (in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1982</u>
Growth of effectiveness of total labor expenditures	100	100	100
Including:			
From reduction of expenditures of live labor	43.0	41.6	8.9
From reduction of expenditures of embodied labor	57.0	58.4	61.1
Including:			
From reduction of expenditures of labor embodied in consumed objects of labor:	57.0	57.1	60.2
a) from reduction of total labor on reproduction of objects of labor	51.8	52.2	50.5
b) from change in material-intensiveness of products	5.2	4.9	9.7
From reduction of expenditures of labor embodied in consumed means of labor:	--	1.3	0.9
a) from reduction of total labor on reproduction of means of labor	--	1.3	0.9
b) from change in output-capital ratio*	--	--	--

* Since the republic's output-capital ratio decreased, all the increase in the effectiveness of expenditures of total labor was gained by reducing expenditures of total labor on the reproduction of fixed production capital.

It is typical that the economic effectiveness of public production increased in the republic to a greater degree as a result of reducing expenditures of

embodied labor, and primarily as a result of labor which is embodied in consumed objects of labor.

The increased economic effectiveness of public production, to an ever greater degree as a result of the reduction of expenditures of an embodied labor and especially as a result of a reduction of expenditures of labor embodied in consumed objects of labor, is conditioned by further deepening of public division of labor. The increased effectiveness of expenditures of embodied labor has also been influenced by the fact that material-intensiveness of products in the republic dropped by 7 points during the period that was analyzed, which provided for a 9.5-point reduction of labor expenditures embodied in consumed means of production, and a 9.7-point reduction of expenditures of labor embodied in consumed objects of labor.

The increased economic effectiveness of public production in the republic as a result of reduced expenditures of embodied labor could be more significant if they were reduced in agriculture, where there has been a considerable increase in the expenditures of embodied labor on the production of each unit of each output.

An increase in the economic effectiveness of public production was observed in the Estonian SSR for individual periods, but the rates had decreased (see Table 4).

The main reasons for the slowing up of the growth rates of the economic effectiveness of production are: the aging of fixed production capital; the existence of a considerable proportion of workers who perform manual work (this is brought about to a certain degree by the fact that with a continuous increase in fixed production capital that is put into operation on an average per one worker, comprehensiveness is still not provided in the mechanization of production processes); the underutilization of existing production capacities, including as a result of losses of working time because of down time, unexcused absences and absences with the permission of the administration.

Table 4--Growth Rates of Economic Effectiveness of Public Production of Estonian SSR (in percentages of preceding period)

Indicators of Rates of Growth of Effectiveness of Expenditures	1970- 1975	1975- 1980	1980- 1981	1981- 1982
Total labor	129.1	118.8	101.7	105.9
Live labor	131.5	118.7	101.3	102.1
Embodied labor	127.5	118.9	101.9	108.6
Labor embodied in consumed objects of labor	131.2	120.3	102.7	109.7
Labor embodied in consumed means of labor	99.3	109.6	96.4	102.2

It should be emphasized that the analysis of the economic effectiveness of public production in the republic that was conducted according to the system of indicators we suggested confirms the point of K. Marx to the effect that: "Increased labor productivity consists precisely in that the share of live

labor decreases and the proportion of past labor increases, but it increases in such a way that the overall sum of labor included in the commodity decreases.³

During the period of time that was analyzed the proportion of live labor for the production of a unit of output in the national economy of the Estonian SSR decreased from 42.9 percent to 38.2 percent, and the proportion of embodied labor increased from 57.1 percent to 61.8 percent. Moreover expenditures of live and embodied labor on the production of a unit of output decreased by 39.5 percent. As a result of this the economic effectiveness of public production in the Estonian SSR during 12 years (1971-1982) increased by 64.2 points.

Indicators of the economic effectiveness of public production utilizing expenditures in monetary measurement were calculated according to the following methodology:

the effectiveness of expenditures of total labor⁴--as the ratio between the gross social product (gross output) in comparable prices and its value, that is, the gross social product in current prices;

the effectiveness of expenditures of live labor--as the ratio between the gross social product in comparable prices and the amount of newly created value, that is, the national income in current prices;

the effectiveness of expenditures of embodied labor--as the ratio between the gross social product in comparable prices and the value of consumed material resources, that is, their expenditures in current prices;

the effectiveness of expenditures of labor embodied in consumed objects of labor--as the ratio between the gross social product in comparable prices and the value of consumed material resources (not including the value of consumed fixed capital), that is, their expenditures in current prices;

the effectiveness of expenditures of labor embodied in consumed means of labor--as the ratio between the gross social product in comparable prices and the value of consumed fixed production capital, that is, their expenditures in current prices.

The following results were obtained using the methods presented above (see Table 5).

It is not difficult to note that these figures describe quite a different picture from the one described by the figures in Table 2. With the expenditure of a certain growth in the effectiveness of expenditures of live labor, there is a continuous reduction of expenditures of embodied labor. Moreover, the increased effectiveness of live labor did not cover the reduction of the effectiveness of expenditures of embodied labor. As a result, the effectiveness of the expenditures of total labor did not increase, and during the past 2 years they even decreased as compared to 1970.

Table 5--Growth Rates of Effectiveness of Labor Expenditures, Reflected
in Monetary Units of Measurement, in Estonian SSR National Economy
(in percentages of 1970)

<u>Indicators</u>	<u>1975</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Growth rates of effectiveness of expenditures:				
of total (live and embodied) labor	101.0	100	99.0	95.9
of live labor	110.5	110.1	107.9	108.3
of embodied labor	95.3	93.6	94.2	88.9
of labor embodied in consumed objects				
of labor	97.9	96.8	97.9	92.6
of labor embodied in consumed means				
of labor	77.0	71.0	67.4	65.1

The difference between the tendencies of the indicators of economic effectiveness of public production calculated per monetary unit of labor expenditures and the analogous indicators calculated per physical unit of labor expenditures is brought about by the fact that the change in prices for the means of production does not reflect changes in expenditures of total labor on their reproduction.

Thus while the average price per unit of consumed objects of labor in industry of the Estonian SSR increased as compared to the average price per unit of consumed objects of labor in 1970 by 0.18 points, the total expenditures of labor on their reproduction during this period of time decreased by 41.4 points. Therefore when utilizing in calculations of the economic effectiveness of public production the physical and monetary measurements of labor expenditures there are positive tendencies. For this same reason there is a contradictory evaluation of the effectiveness of expenditures that are transferred to the product from the fixed production capital.

Of the methods of evaluating the economic effectiveness of public production considered above the most realistic results can be obtained, in our view, by the method that is based on comparing production volumes and physical indicators of labor expenditures. The other methods considered in the article do not make it possible to draw correct conclusions: whether the economy of a given region has developed effectively or ineffectively during the period that is being investigated.

FOOTNOTES

1. Marx, K., and Engels, F. "Soch." [Works], vol 23, p 232.
2. Formula (5) can be transformed into the formula $W_{zh} = VP:T$, where T characterizes expenditures of live labor on the production of the entire volume of output.
3. Marx, K., and Engels, F., "Soch.", vol 25, part I, p 286.

4. The calculation of the effectiveness of expenditures of total labor according to this ratio is also correct if it is understood as the ratio between base and current prices since the effectiveness of production of products is characterized by a reduction of its value which is manifested in the form of the price.

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REGIONAL DEVELOPMENT

UKRAINIAN SSR MATERIAL-TECHNICAL BASE SURVEYED

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[Article by A. Yemel'yanov, corresponding member of the UkSSR Academy of Sciences: "The Strengthening of the Material-Technical Base--the Main Economic Task of the Party and the People"]

[Text] The material-physical elements represent the totality of the material-substantive elements of the productive forces and the organizational-technical conditions which form the basis of material production. It characterizes the level of development of the productive forces of a society, its possibilities, and its economic and productive potential.

Among the physical elements of the productive forces, a decisive role belongs to the means of labor, which in the process of production are conducive to the increase of its productivity and to the supply of the necessary output of material and spiritual goods. The improvement and further development of the means of labor requires the expansion of the range of the objects of labor being used, the application of new technologies, materials, and types of energy; it is connected with the necessity of improving the organization of production. Although labor resources are not included in the composition of the material-technical base, their professional and cultural-technical level nevertheless constitutes an indispensable condition for the effective utilization of the material-technical base of a society.

Every mode of production is characterized by its own material-technical base, which provides the material conditions corresponding to its socio-economic nature. The material-technical base of socialism is formed on the basis of the collectivization of production and labor, the carrying out of socialist industrialization, the collectivization of agriculture, and the strengthening of the defense capacity of the country. Characteristic features of the material-technical base of the developed socialist society are colossal volumes of national wealth, highly developed industry, enormous and highly-developed agriculture, a powerful infrastructure network, and a high scientific-technical level of personnel. With every five-year-plan, dozens of new large industrial centers and junctions, transportation arteries, and territorial complexes are making their appearance. There is rapid growth in the productive and scientific-technical potential of the all sectors of the national economy, an increase in the level of the well-being and culture of the people, and an increase in the strength of the defense capacity of the country.

The national wealth accumulated during the years of the five-year-plans amounted to 2.7 trillion rubles (without the value of mineral wealth, land and timber resources) at the beginning of the 1980's. Fixed assets constitute its most important part. In the middle of the 11th Five-Year-Plan, their sum came to approximately 2.1 trillion rubles, of which more than 1.4 trillion rubles fall to the share of basic producer goods--the material basis of the powerful production potential of the country. During the years of the 9th, 10th, and the first 3 years of the 11th five-year-plans, more than 800 billion rubles worth of them were created. The portion of these assets now considerably exceeds half of the assets operating altogether in the national economy. At the beginning of 1984, the number of workers and white collar workers employed in the national economy of the country, as well as kolkhoz farmers, came to about 130 million persons. From year to year there is an increase in the number and the ratio of specialists with higher and secondary specialized education.

The material-technical base of the USSR, therefore, possesses today colossal production potential. The national income of the country--this most important resulting indicator, which determines the possibilities of socialist expanded reproduction and current consumption--came to 530 billion rubles in 1983. The industry of the country is capable of producing annually more than 2 billion tons of conventional fuel, more than 1.4 billion kilowatt hours of electricity, 150 million tons of steel, about 19 million tons of steel pipes, and approximately 30 million tons of mineral fertilizers (in 100 percent nutrients equivalent) 4.4 million tons of synthetic resins and plastics, 1.4 million tons of chemical fibers and 2.2 billion rubles worth of metal-cutting machine tools, including 600 million rubles worth of tools with numerical program control. During 1983 there was an almost twofold increase in the output of automatic manipulators with program control--approximately 11,000 industrial robots were produced.

The production complex for consumer goods in 1983 gave the country 1.3 million automobiles, 4.2 million washing machines, 5.7 million refrigerators, 18 million radio receivers and televisions, more than 7 billion rubles worth of furniture, 11.4 billion square meters of fabrics of all types, 1.6 billion units of knitted underwear and outer wear, 745 million pairs of leather shoes, 3.2 million tons of sausage products, 1.5 million tons of butter, about 28 million tons of whole-milk products in terms of milk, 12.4 million tons of granulated sugar, more than 17 billion conventional units of canned goods, etc.

The efficiency of the agricultural sector of the economy is growing. In spite of difficult weather conditions, the production output in 1983 increased by 6.4 billion rubles and attained a volume of 134 billion rubles. There was an increase in the gross harvest of grain, sugar beet, long-fiber flax, potatoes, meat, milk, eggs and wool. Thanks to the energetic measures taken in carrying out the decisions of the May (1982) Plenum of the CPSU Central Committee within the framework of the Food Program of the USSR, the economy of the kolkhozes and sovkhoses has been strengthened. Their profit came to almost 17 billion rubles in 1983. There has been a decrease in the number of unprofitable farms.

Within the composition of the material-technical base of the USSR, the material-technical base of the Ukraine is developing successfully. At the beginning of 1984, the total value of the fixed assets of the republic came to 337 billion rubles, which exceeds almost threefold their magnitude at the end of 1965 and by 10 billion rubles--the tasks of the five-year-plan. Moreover, two-thirds of all fixed assets of the republic (220 billion rubles) are now made up of basic producer goods--the material basis of the modern economy of the Ukraine. Half of them fall to the share of the producer goods of industry. Today the industrial base of the Ukraine represents the combination of a powerful fuel-energy and metallurgical complex with highly-developed modern machine building and chemistry, as well as a multi-sector complex for the production of a broad assortment of food and non-food consumer goods.

Within the framework of the constantly improving public territorial division of labor, purposeful structural advances are being systematically realized, which are connected, first of all, with the more intensive utilization of the powerful production apparatus that has been created in the capital-intensive sectors of heavy industry and the accelerated increase of the potential in sectors playing a decisive role in the materialization of the achievements of scientific-technical progress. This positive process is also developing in the current five-year-plan.

In spite of the outstripping development of the fuel-energy base in the eastern regions of the country, where more favorable conditions exist for this, the Ukraine continues to play the important role of the large supplier of solid fuel, in particular coking coal for the needs of ferrous metallurgy not only of the European part of the USSR, but also a number of CECA member countries. In 1983 the Ukraine provided the power system of the country and the Mir [Peace] Energy Ring with 243 billion kilowatt hours of electric power, or more than 17 percent of its all-union production. In the current five-year-plan and in the future, nuclear energy will make a decisive contribution to the growth of the production of electric power in the UkSSR, since the resources of the traditional energy sources are virtually exhausted.

The unique combination, on the territory of the Ukraine within the confines of a compact region, of the high-quality Donetsk coals, the Krivorozhskiy, the Kremenchugskiy and Kerchenskiy iron and the Nikopol'skiy manganic ores, as well as various other raw material components (fluxing limestones, dolomites, silica brick quartzites, fireclays, and others) make it possible to successfully develop and improve the ferrous metallurgy base of the republic. The share of the Ukraine in the all-union production of iron ore exceeds one-half, and in the smelting of steel and the output of rolled stock and steel pipes--one-third.

The trademark of UkSSR plants is found on powerful rolling mills, walking and rotary excavators, forge and press equipment and turbine generators. The republic provides 95 percent of the union production of trunkline diesel locomotives, approximately one-fourth of the alternating current motors, excavators, tractors and agricultural machines, chemical equipment, more than one-half of the trunkline freightcars, one-fourth of the output of the instruments, means of automation, computer technology and the spare parts for it, about one-third of the televisions, and more than 12 percent of the automobiles.

Within the all-union division of labor, the Ukraine acts as a large producer of mineral fertilizers (more than 16 percent in 1983), soda ash, sulphuric acid, titanium white pigment and carbon black, bromine, tires and industrial rubber products. During the past five-year-plans there has been a noticeable increase in the contribution of the republic to the all-union production of chemical fibers, synthetic resins and plastics, and dyes. The chemical-pharmaceutical industry is of all-union significance.

The production of light and food industry in combination constitutes almost one-third of the total volume of industrial production of the UkSSR. At the present time, the material-technical base of the republic makes it possible to manufacture almost one-fourth of the leather footwear and about one-fifth of the knitted underwear, and outer wear and garments being produced in the country. During the years of the 8th, 9th and 10th five-year-plans, the output of the food industry of the Ukraine increased by three-fourth. The republic is one of the largest producers of sugar not only in the country, but in the world as well: In 1983 approximately 7 million tons of it were produced, or about 56 percent of the all-union volume. The average annual production of meat, milk and butter constitutes 20-25 percent, and of vegetable oil--more than one-third of the all-union production.

The material-technical base of the agro-industrial complex is being strengthened rapidly. The consistent putting into practice of the agricultural policy of the CPSU and the realization of the Food Program--these are the powerful impulses which are conducive to the increasingly stable development of the agricultural sector of the economy. In the past few five-year-plans, the share of the republic in the average annual production of the gross output of the agriculture of the country came to approximately 23 percent, including almost 25 percent with respect to the production of plant-growing, and about 22.5 percent in animal husbandry. The share of the UkSSR in the all-union production of the most important forms of agricultural production has become settled within the same limits.

A component part of the material-technical base of the UkSSR is its developed transportation system. The density of the railway network being operated in the republic exceeds the average-union indicator by a factor of almost 6, and of the network of highways with hard surface--by a factor of 6.4. Appreciable is also the share of the Ukraine in the total volume of freight transports by railway (more than one-fourth) and motor vehicle (about one-fifth) types of transportation.

In the contemporary stage, the most important directions of the further strengthening of the material-technical base are the following:

--The acceleration of the introduction of the achievements of the scientific-technical revolution by virtue of the systematic development of all elements of the material-technical base, the conduct of a single state policy of scientific-technical progress, the subordination of the main directions of scientific-technical progress to the interests of the entire society, the creation of interest of the workers in the application of new technology, and the

and the development of cost accounting relations between science and production;

--the creation of the material-technical conditions for the transfer of the economy to the intensive path of development;

--comprehensive mechanization, automation and robotization of the production processes;

--every conceivable development of new, economically efficient production sectors, new types of energy and materials;

--the increase of the technical level of production, in particular the creation and assimilation of advanced machines, mechanisms, equipment, the technology being employed, the increase of the rates of the technical reequipment of all sectors of the national economy, and the growth in the share of production of the highest category of quality;

--every conceivable economy and the rational utilization of material-technical, natural and labor resources;

--the utilization of a program-specific approach in the improvement of the material-technical base;

--the increase of the general education and cultural-technical level of the workers;

--the improvement of planning and the strengthening of the role of economic levers and stimuli in the development of the material-technical base.

An important feature of the modern material-technical base is the fundamental change of the role and place, in it, of science and scientific research activity. The scientific revolution is merging with the technical revolution in the presence of the outstripping development and leading role of science. Side by side with the objectification of science in the instruments and objects of labor, calling forth the merging of two autonomous streams into a single stream of scientific-technical progress, the materialization of science also occurs in the organization of production and in its management. New organizational forms of the relationship between material-productive and scientific-theoretical activity are coming into being in the form of production and scientific production associations, and scientific-technical complexes. Science is exerting an important influence on the level of the replacement of human labor by machine labor in the execution of production functions, freeing it not only from the expenditures of labor, but also the functions connected, to a significant degree, with mental activity, the control of technology, the control over the course of technological processes, and the planning and design preparation of production.

The process of transition from the utilization of machines being controlled by the hand of man to automatic, self-governed systems of machines represents the chief and decisive direction of the scientific-technical revolution. Thanks to

automation, the development of new sources of energy will become possible, as well as the development of space and the transition to new technology, which, as a rule, bears a "closed character", i.e., excludes the direct participation of man.

In our country, the development of automation, its quantitative and qualitative growth, are constantly being given a great deal of attention. On 1 July 1981, the number of automatic lines in the industry of the USSR came to more than 27,000,¹ including more than 4,000 in the UkSSR.² During the first 6 months of 1984, approximately 4,000 mechanized continuous production flow and automatic lines were established in industrial enterprises, and more than 2,000 sections, shops and plants³ (in the UkSSR, respectively, 635 and 600 units⁴) were transferred to comprehensive mechanization and automation.

An important technical basis of the further automation of production is the transition to the broad application of automatic manipulators (robots). More than 160 models of automatic manipulators have been created in the USSR. In the 11th Five-Year-Plan, the machine-tool industry sector produced more than 7,000 of them for servicing metal-working, wood-working and foundry equipment and about 3,000 for electroplating shops and sections.⁵ The use of robots in the non-production sphere is expanding, especially in the sphere of maintenance and the sphere of mental labor. Robot technology is also beginning to penetrate the sphere of housework.

Side by side with the machines controlling the production processes, information-dispatcher machines are acquiring broad dissemination, which exercise control over the course of production processes, the good working order of equipment, the movement of materials and semimanufactures, as well as machines intended for accounting and economic purposes (calculation, estimate of expenditures and production cost, planning and calculation of the best variants of the work of an enterprise). The most important task is the creation of automated systems of control of the economic activity of enterprises and the broad use of electronic machines in management work.

The further strengthening of the material-technical base is directly related to the development of power engineering, which means:

- The requisite development of the extraction and production of the basic, most progressive energy sources. Of the greatest significance in this matter is the solution of the problem of atomic fuel on the basis of the process of the multiplication of plutonium in fast reactors;

- the appropriate development of the power engineering industry and the electric engineering industry, which must secure the creation of the necessary capacities for the production of power, the output of the needed number of power-receiving, power-transmitting, and transforming mechanisms and equipment, as well as the output of power and especially electrical engineering equipment;

- the creation and introduction of new, most advanced and efficient technological methods for the production and utilization of power, in particular--electric power;

--the development of energy production proper. In principle new in this matter must be the production of electric power in MHD-generators, which secures the direct conversion of heat into electric power;

--the construction of necessary lines of transmission for long distances with utilization of the phenomena of superconductivity;

--the production and saturation of the economy with power consumers, with the most diverse mechanisms, instruments and equipment.

In the current five-year-plan, the power industry is rising to a qualitatively new stage of development. In 1985 the output of electric power in our country will reach 1,555 billion kilowatt hours. Nuclear power is developing at outstripping rates: The introduction of capacities in nuclear power plants in the USSR will amount to 24-25 million kilowatts, and the output of electric power will reach 220-225 billion kilowatt hours and is almost equal to its production in hydroelectric power plants.

In the UkSSR the development of the power industry is being realized basically through the introduction of capacities at the Chernobyl'skaya, Yuzhno-Ukrainskaya, Rovenskaya, Zaporozhskaya, Khmel'nitskaya, and Krymskaya nuclear power plants. Their proportion of the total production of electric power in 1985 will come to 26 percent. The construction of the Odessa Nuclear State Electric Power Station is also being realized and the construction of the Dnestrovskaya Hydroelectric Power Station is being completed, as a result of which the fuel-energy balance of the republic will improve.

Thanks to the realization of the agricultural policy of the party, appreciable changes have taken place in the development of the material-technical base of agriculture. Capital investments in the agriculture of the republic for the entire complex of work increased from 21.3 billion rubles in 1971-1975 to 25.4 billion rubles in 1976-1980. During the 3 years of the current five-year-plan, their volume came to 15.8 billion rubles. In the course of 1970-1982, the fixed production assets for agricultural purposes in the public sector of the republic increased by a factor of 2.5, the capital-labor ratio increased by a factor of 2.9, and the power-labor ratio--by a factor of 2.4. As a result, the average annual number of workers of the public sector of agriculture during the same period diminished by 967,000 persons. On the one hand, this is indicative of the intensive process of the replacement of living labor by embodied labor; on the other hand, it calls forth the necessity of rapidly building up the means of production to compensate for the labor resources being released from the sector.

For the efficient utilization of the chief means of production--the land, in the republic, progressive systems of agriculture and production technology are being introduced, the agricultural management of working the soil is being improved, crop rotations are being developed, a battle against production losses is being waged, advanced methods of the utilization of fertilizer are being introduced, agrotechnical, biological and chemical means of plant protection are being applied, new high-yield varieties are being introduced, and seed production of the crops being cultivated is being improved.

One of the basic directions of the intensification of agriculture is the comprehensive mechanization of production processes. In the decisions of the May (1982) Plenum of the CPSU Central Committee it was emphasized that the paramount task of the machine building ministries, all ministries and departments of the agroindustrial complex is the completion, basically prior to 1990, of the comprehensive mechanization of agriculture and animal husbandry. With a view to the realization of this task, measures were developed and are being introduced in practice that are aimed at increasing the deliveries of technical means to agriculture, the improvement of their quality, and the output of complexes of machines and equipment for the introduction of industrial technology.

During the current five-year-plan, the agriculture of the republic will be supplied with 275,000 tractors, 242,000 trucks, 68,000 grain combines, and a lot of other equipment. The average capacity of a tractor will increase from 72 to 85 horse power, the carrying capacity of the truck--from 3.6 to 4.1 tons. Agriculture is being reliably supplied with electric power from the state power systems, which guarantees its broad utilization for production and everyday needs. During 1971-1982, the consumption of electric power in the agriculture of the UkSSR increased by a factor of 2.5. As a result of the growth of the technical equipment of kolkhoz and sovkhos production, the basic types of field work are fully mechanized, and the planting of potatoes, the inter-row cultivation of sugar beet crops, corn, the grain combining of corn, etc., are close to completion with respect to mechanization.

In spite of the sufficiently high rates of the technical reequipment of agriculture, the equipment of kolkhozes and sovkhos with machines and implements lags behind the norm. . Production is experiencing a sharp demand for power-equipped tractors and the train of machines for them, fodder-harvesting equipment, trucks, tractor trailers, harrows, and other equipment. The structure of the machine and tractor fleet is in need of improvement.

The strengthening of the intensification of the agriculture of the republic is inseparably linked to the development of land improvement since a significant part of the territory is located in the zone of insecure moistening and the irrigation areas have an excess of moisture. Improved soils, whose area in the republic at the beginning of 1983 came to 4.8 million hectares, are a guaranteed reserve for the increase of the output of agricultural production. Thanks to the realization of a broad program of improvement work, there has been an appreciable increase in the role of irrigated and drained land in supplying the needs for vegetables, grain (primarily rice), fodder, and other types of production. The experience of the progressive farms of the Crimean, Kherson and other oblasts of the UkSSR testifies to the fact that every hectare of irrigated land yields 2-3 times more production than a non-irrigated one. The productivity of drained land is also higher. All the same, for the time being the plan yield is not secured on all improved lands.

With a view to the realization of the Food Program, a comprehensive plan of fodder production has been developed and is being carried out in the republic--a plan in which measures are envisaged for the improvement of field fodder production, natural haymaking and pastures, the broad introduction of advanced equipment for the manufacture and preservation of feeds, their preparation for

feeding, the increase of the production of feeds of industrial manufacture, the strengthening of the material-technical base of feed production, the creation of a system of machines for this sector, a reliable system of warehouses, depots and many others.

Progressive solutions in the improvement of the material-technical base have entailed qualitative changes in the structure of capital investments--there has been an increase in the share of capital expenditures for the active part of basic production assets and a decrease in the proportion of expenditures for construction and installation work. Thus, in the 1st Five-Year-Plan the proportion of equipment, tools, and implements in the total volume of capital investments of our country amounted to 0.8 percent; at the present time it has attained 40 percent. The formation, in the sectors of the national economy, of the number of jobs that would be balanced with manpower resources and would meet the modern achievements of scientific-technical progress is becoming the most important requirement made of the material-technical base.

At the present time, the UkSSR Gosplan and the UkSSR State Committee for Labor and Social Problems envisage the conduct, in the industrial enterprises of the republic, of the registration and attestation of jobs in order to successfully control this important national economic proportion in departmental and territorial sections in the 12th Five-Year-Plan. The experience of the Dnepropetrovsk Combine Plant imeni K. Ye. Voroshilov shows the positive influence of this work on the efficiency of production and the renewal of basic production assets. Thus, the coefficient of equipment removal came to more than 6 percent in the plant per year, which is significantly higher than in the machine building industry of the republic (1.7 percent).

Within the framework of the republic special purpose integrated program "Trud" [Labor], 217,000 persons in 1983 alone were transferred from manual to mechanized labor by virtue of the establishment of 2,210 mechanized continuous production flow and automated lines, the comprehensive mechanization and automation of 1,700 sections, shops and factories, as well as the introduction of scientific-technical measures and means of small mechanization.

The improvement of planning and the strengthening of the role of economic levers and incentives plays a special role in reinforcing the material-technical base. They not only make it possible to develop the material-technical base purposefully and systematically, but also stimulate the better utilization of its possibilities. In conformity with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Additional Measures to Expand the Rights of Production Associations (Enterprises) of Industry in Planning and Economic Activity and to Strengthen Their Responsibility for the Results of Work" (1983), a broad economic experiment is being conducted as of 1 January 1984, in which enterprises of the ministries of heavy and transport machine building and the electrical equipment industry and of the food industry of the UkSSR, light industry of the BSSR, and local industry of the LiSSR are taking part.

The enterprises participating in the experiment received broader possibilities for the strengthening of the material-technical base. In the first place, this concerns the planning of the technical reequipment of production, taking into

account the utilization of the accumulated production potential. The substantiation of the reproduction and technical structure of capital investments is now realized from the positions of securing the optimal proportions of the reproduction of basic production assets within the framework of the renovation term on the basis of their rhythmic and efficient renovation. Simultaneously limits are established with respect to jobs and limits with respect to the numerical size of the personnel. In the development of the material-technical base of the enterprises (associations), there is an increase in the role of funds for the development of production, through which measures are realized in regard to the mechanization and automation of production, the replacement and modernization of equipment, and the improvement of labor organization. The means of the fund for the development of production are fully included in the plans of capital construction of the ministries and departments and are provided on a first-priority basis with the necessary capital investments, material resources and volumes of contract work. The enterprises and associations working in the conditions of the economic experiment by virtue of the means of these funds alone secure the necessary increase in the technical level of production. Control over the rationality of the utilization of the means from these funds is realized through the assessment of the economic efficiency of the measures in regard to the technical reequipment of production, including the effectiveness of expenditures for the growth of production capacities.

The broad application of economic standards stimulates the efficient use of all types of production resources and guarantees enterprises and associations the creation of the kinds of conditions of management that secure highly-productive labor, creative initiative and socialist enterprise. The dimensions of the wage fund and the material incentives fund are directly dependent on the quality indicators of labor. Enterprises and associations carrying out the acceptance and start-up of large projects are allotted an additional wage fund for the payment of the labor of the workers engaged in making the new capacities operational. Savings with respect to the wage fund are utilized for the establishment of increments and additional payments over and above the wage rates for highly-skilled workers, engineering and technical personnel, and employees, proceeding from their personal contribution to the development and introduction of new technology and equipment and the lowering of the resource-intensiveness of production.

The strengthening of the material-technical base entails corresponding changes in the content and character of labor, which find their reflection above all in fundamental changes of the professional-skill composition of the combined labor force. Many professions of heavy labor are disappearing, new professions and specialties are making their appearance that are related to the maintenance of modern means of labor and technological processes making use of new sources of energy and materials.

The more perfect material-technical base has accelerated the growth of general and technical education of the workers and the increase of their skill. The level of skill has come to be determined not only by the sum of habits, workmanship and virtuosity, but also above all by the sum of knowledge. There is an increase in the significance of design and scientific-technical activity, the invention and testing of new machines, and the mastery of new technological processes. In connection with the fact that the scientific revolution calls

forth and accelerates a certain displacement from the production process proper to work with respect to its planning and preparation, the enterprises have an increased demand for mathematicians and technicians, scientists and research workers, and workers for supervision of modern machine-tools, the most precise measuring instruments and apparatus. The growth of the qualifications of the workers finds its reflection in the increase of the average category of the workers.

In modern production, there is an expansion of the professional profile of the workers and an increase in the level of their scientific-technical knowledge.

Modern science, technology and manufacturing methods in socialist society are changing the entire culture of labor, are making it more perfect, systematic and creative, and are making it possible to introduce such new forms of production organization as integrated brigades, a firm daily routine, an hourly schedule and precise supervision of the course of production, and methods of rhythmic production output. The strengthening of the material-technical base is creating the conditions for erasing the borders between mental and physical work, for improving socialist labor relations, for strengthening of the creative cooperation of workers, and for the broad exchange of experience and knowledge. It is the basis for the further growth of the well-being of the Soviet people.

FOOTNOTES

1. "Narodnoye Khozyaystvo SSR. 1922-1983. Yubileynyy statisticheskiy yezhegodnik" [The National Economy of the USSR. 1922-1983. Anniversary Statistical Yearbook], Moscow, "Finansy i statistika", 1983, p 132.
2. "Narodnoye khozyaystvo Ukrainskoy SSR v 1982" [The National Economy of the Ukrainian SSR in 1982], Kiev, "Tekhnika," 1983, p 57.
3. PRAVDA, 22 July 1983, and PRAVDA UKRAINY, 25 July 1984.
4. EKONOMICHESKAYA GAZETA, No 33, 1981, p 1.
5. Ibid.

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